PMI

PHOTO METHODS FOR INDUSTRY

VOL.4NO.2
FEBRUARY
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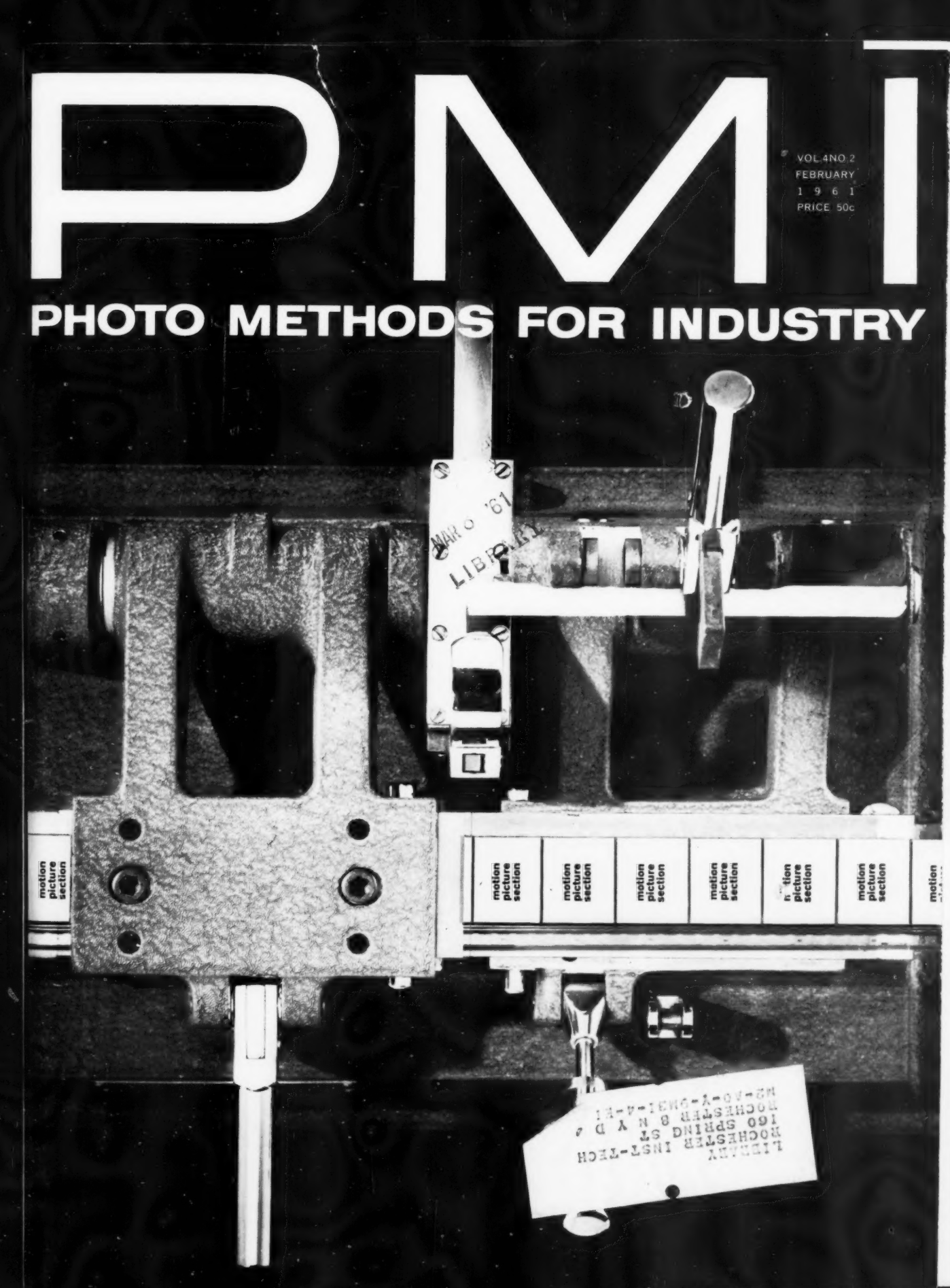

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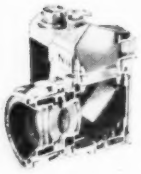

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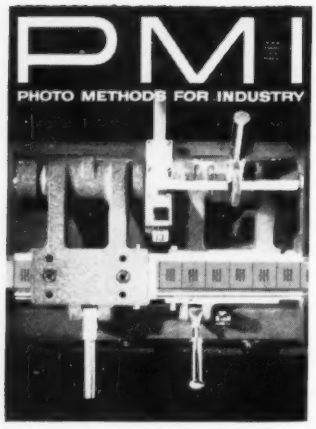

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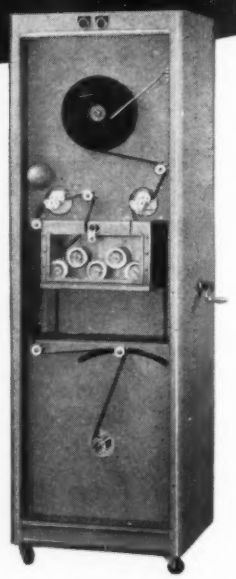

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COMING UP

FEBRUARY 21-23 NAVA Western Conference, Hotel Coronado, Coronado, California.

MARCH 12-16 MPDFA Convention, Convention Hall, Philadelphia, Pa.

MARCH 19-22 Professional Photographic Society of New York, Convention. Manger Hilton Hotel, Rochester, New York.

MARCH 19-25 American Society of Photogrammetry, Annual Meeting, Hotel Shoreham, Washington, D. C.

MARCH 23-26 Westprint 61, Graphic Arts Exposition. Shrine Exposition Hall, Los Angeles, Calif.

MARCH 27-29 Advertising Essentials and National Sales Aid Show, Hotel Biltmore, New York, N. Y.

MARCH 30-APRIL 1 Industry Film Producers Association Convention. Miramar Hotel, Santa Monica, Calif.

MONTHLY MEETINGS

Association of Federal Photographers Meetings every third Wednesday at 8 p.m. G.S.A. Building, 7th and D Sts., S.W., Washington, D. C.

Binghamton Chapter SPSE Meetings every third Tuesday. Contact H. G. Morse, Ansco, Binghamton, N. Y. RA 2-4221, Ext. 573.

Boston Chapter SPSE Contact John Taylor, Itek Corp., 700 Commonwealth Ave., Boston, Mass., CO 7-5210.

Chicago Chapter Biological Photographic Assoc. Meetings every third Tuesday. Contact Dorothy Pinkham, 551 W. Grant Pl., Chicago, Ill. DI 8-6400.

Cleveland Chapter SPSE Meetings the first Tuesday of each month. Cleveland Engineering & Scientific Center, 3100 Chester Ave., Cleveland, Ohio. Contact Robert E. Birr, General Electric, Nela Park, Cleveland, Ohio. GL 1-6600.

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COMING UP

(*continued from page 6*)

Industrial Photographers of America Essex House, Newark, N. J. Meetings every second and fourth Thursday. Contact Tom Holbarton, 181 Lake Drive West, Packanack Lake, Wayne, N. J. or R. Handley, The Port of New York Authority, 111 8th Ave., New York 11.

Manhattan Chapter Society of Reproduction Engineers Meetings every third Monday. Contact J. Ryerson, Joseph Dixon Crucible Co., Newark 2, N. J. DE 3-3000.

Midwest Industrial Photographers' Association Contact John E. Schrage, c/o Deere & Co., Photo Department, 3300 River Drive, Moline, Ill.

National Visual Presentation Association, Inc. New York City. Meetings every second Thursday. Contact M. E. Shack, 19 W. 4th Street, N. Y., N. Y. MU 2-2294.

New York Chapter SPIE Meetings every third Thursday. Contact Don Bass, P.O. Box 177, Bethpage, L. I., N. Y. Liggett 4-8196.

New York City Chapter SMPTE Meetings first or second Wednesday of each month. Contact Ed Warnecke, Eastman Kodak Co., 342 Madison Ave., New York, N. Y. MU 7-7080.

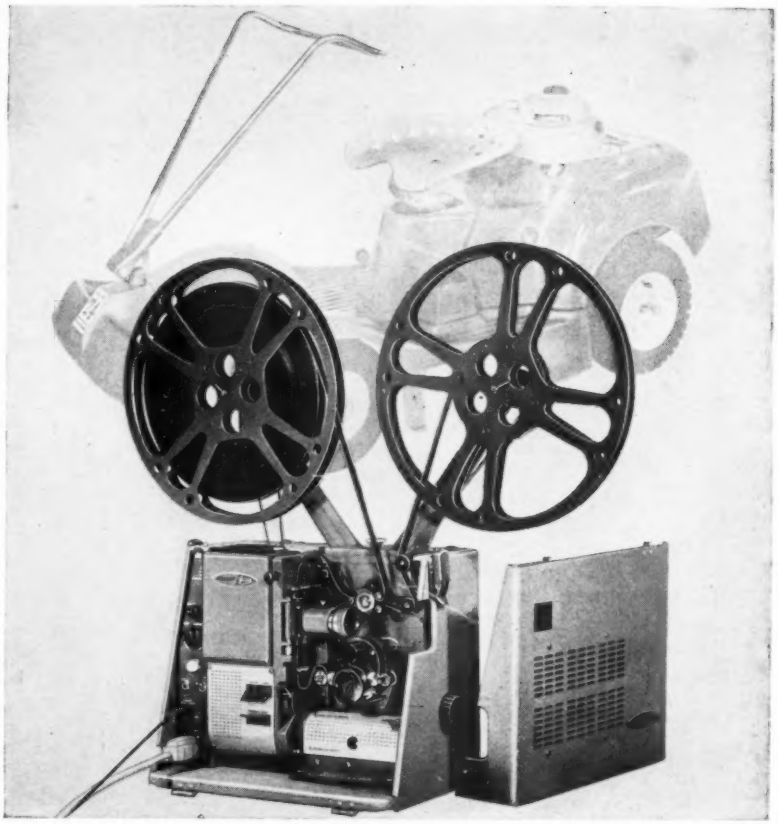
Rochester Chapter SPSE Second Thursday. Contact Woodlief Thomas, Jr. Color Technology Division, Building 65, Kodak Park, Rochester 4, N. Y. CO 6-2500.

Rocky Mountain Industrial Photographers Meetings every Fourth Monday. Contact P. H. Broadie, 2170 S. Lincoln, Denver 10, Colo. Telephone PEarl 3-2200.

Southern California Chapter SPSE Meetings the last Monday of each Month. Contact Ben Augustine, 235 Annandale Rd., Pasadena 2, Calif. Telephone MU 1-0076.

Southern California Chapter Industrial Photographers Meetings every third Tuesday. Contact Janet Marshall, Executive Secretary, 5463 Virginia Ave., Los Angeles 29, Calif. HO 5-6614.

If you wish to have your meeting dates listed in this column send in the necessary information to COMING UP, PMI, 33 W. 60th St., New York 23, N. Y.



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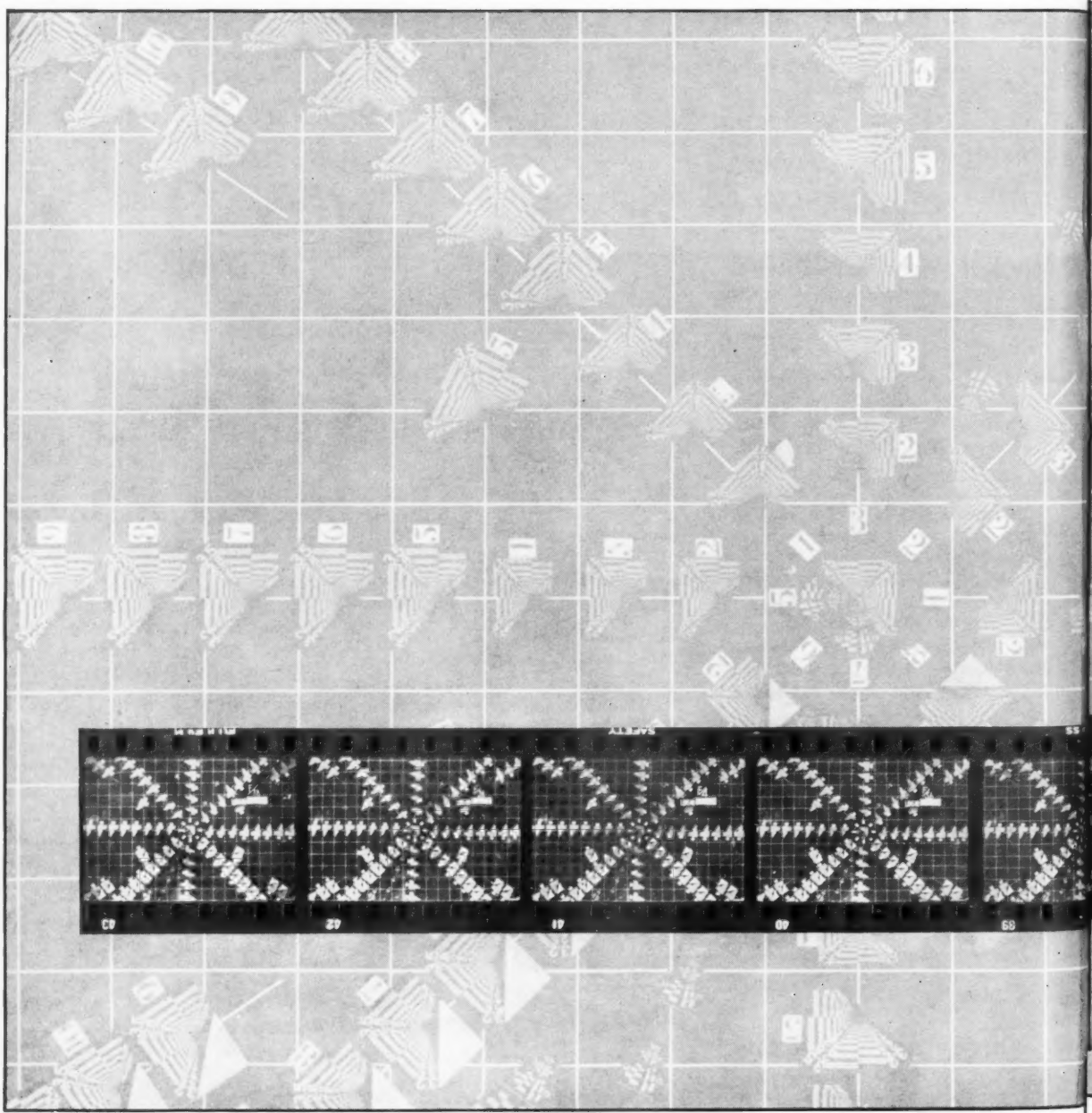

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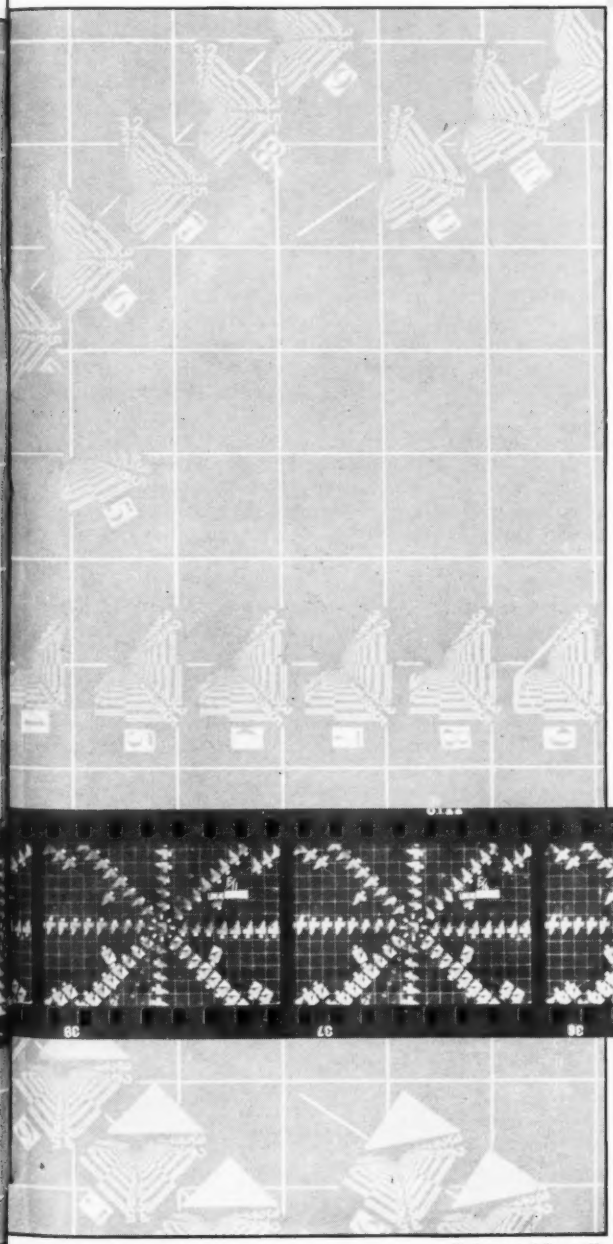

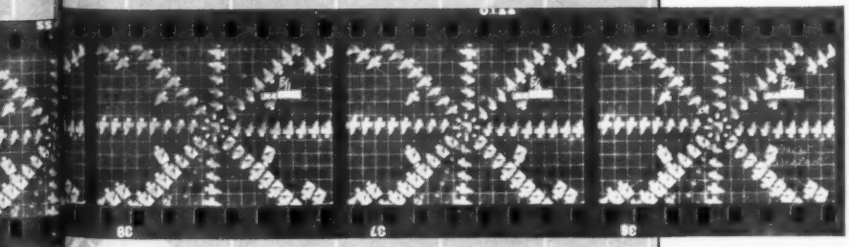

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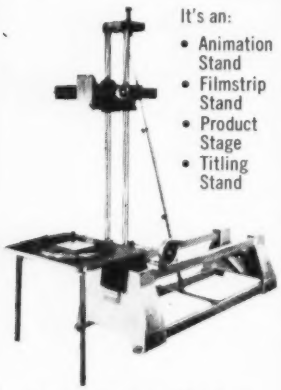

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F.Y.I.

Arriflex, Corp. of America, Natural Lighting Corp. and Magnasync Corp. are combining efforts and all that to present a series of motion picture symposiums around the country. The theme will be "Lights, sound, camera, action!", words dear to every film director since Griffith. The affairs will introduce the latest equipment and techniques and give all sorts of answers to the burning problems of the day.

First stop is Kansas City at the Prom Motor Hotel, February 14 to 16. February 20 and 21, the show will be in Dallas at the Sheraton-Jefferson and March 31 to April 1 at Santa Monica's Miramar Hotel.

One of the standard books in the field and a favorite of ours is *Optics* by Arthur Cox. To many, a book-writer is probably the most impractical type around but we have news for the aggressively practical. Arthur Cox, sometime book-writer, is now an assistant vice-president of Bell & Howell's Photo Products Division, responsible for all photo optics. He came to Bell & Howell as chief optical designer in 1952.

Walter Rybka has been appointed Director of Technical Operations at Paillard. He will be in charge of technical operations including evaluation and development of Bolex and Hasselblad cameras.

Donald McMaster, chairman of Kodak's executive committee retired last month after 43 years of service. His successor is Dr. A. K. Chapman.

Margaret Bourke-White is so famous for her photographic *Life*-manship that people are apt to overlook her start in photography as an industrial cameraman. It was her pioneering in the field that led to the realization that industry was dramatic and full of exciting pictures and that the photographer of industry was worthy of recognition. Any tribute we could pay her would be as clumsy as it would be sincere so we will content ourselves with recording, with great pleasure, yet another award to a great lady. It is the PSA "International Understanding Through Photography Award," underwritten by Nippon Kogaku, manufacturers of Nikon cameras and lenses. The trophy, a silver replica of a pagoda designed by the former president of Nippon Kogaku, was presented in Houston at the annual PSA meeting.

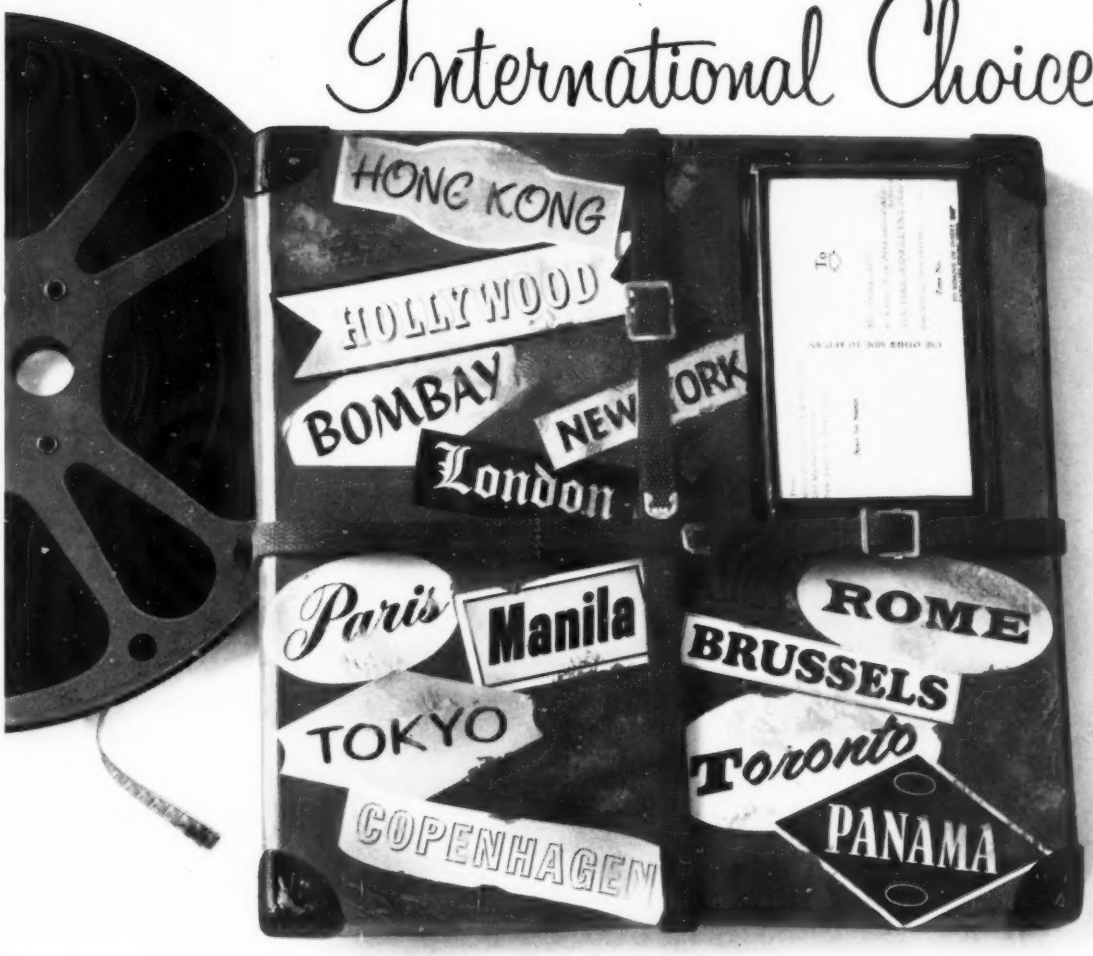
Dr. Herman H. Duerr is now Group Technical Director of Research and Commercial Development for Ansco and Ozalid divisions of General Aniline. His duties will consist of directing research in areas of mutual interest in the two divisions, newly organized into a Photo and Repro Group. Technical Director of Ansco for the past 12 years, Dr. Duerr came to Agfa Ansco in 1931 from the parent Agfa company in Germany.

Tradition has it that Macy's does not tell Gimbels, but we think that some of our contemporaries in the photo field are really worth reading and we like to come out and say so. For example, a helpful source of information on movie matters in general are publications put out by two film labs. One is *Rewind*, published by General Film Laboratories, 106 West 14th Street, Kansas City, Mo. The other is *Cine Magnetic News* edited by Allan Armour for Frederick F. Watson, 202 East 44th Street, New York 17, N. Y. If you plan to go into the movie field, especially into 8mm sound, you owe it to yourself and your management to keep up with developments in the field. Here is one way to be well-informed for nothing. Just drop a line to get your name on the mailing list. Be sure to list your company and title.

"For his untiring devotion to the advancement of industrial photography," our own David B. Eisendrath, Jr., was named "Industrial Photographer of the Year" by the Industrial Photographers Association of America at their 13th Anniversary Dinner on January 26.

It saddens us to report the passing of E. Max Worley, plant superintendent at Cine-Chrome Laboratories, Palo Alto. A veteran in the field, he spent 25 years with Technicolor and Color Reproduction Company before going to Cine-Chrome.—THE END

International Choice!



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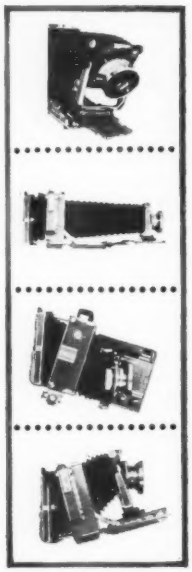

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LETTERS

To the Editor:

The world is demanding from the photographer better color transparencies and prints, and we know it! Photographers are being called on for more and more color transparencies and prints with higher color accuracy, more resolution, more stability of the dye image, and rigid dimensional stability of the base support.

We alone cannot seem to make the photo manufacturer realize that better color films are needed that we can rely on.

A color film that will reproduce a grey scale accurately even though there might be a slight deficiency in some color. We need the color film to reproduce grey tones accurately from highlights through middle tones and shadow areas without shifting in color balance. Resolution of the color film is rapidly becoming of importance to the commercial and industrial photographer also. One last request is for a color film on a stable image support. Believe me, this is an item of extreme importance and is one the film manufacturers should be doing something about now.

How can photographers make film manufacturers realize that we want quality? Why can't the photographer get sensible answers from the manufacturers? This is true even when you confront them with facts; they look at us and tell us, "Your standards are too high." Are they, or are the majority of the photographers content with accepting a mediocre product from these manufacturers? If we can't rely on film manufacturers giving us good consistent materials, how can they expect us to produce top quality with their products.

There have been instances of products that we have used for several years and these were performing a relatively good job when suddenly the manufacturer deletes this item and brings on the market a new one that proves to be inferior to the former product being used. I make this statement based on knowledge of exhaustive tests run to compare products. Perhaps they can convince some people, but there are others of us who make it a point to know some of the facts behind our results.

We shoot color tests of every new

(*continued on page* 24)

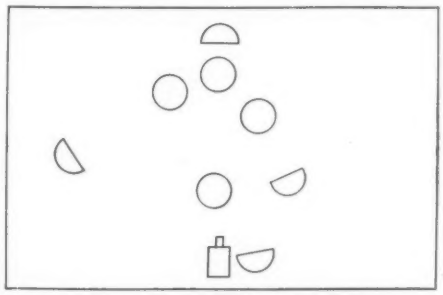
HOW WOULD YOU HAVE LIGHTED THIS PICTURE?

NEWS PHOTOGRAPHER LARRY GEORGE DOES SOME SHARP SHOOTING WITH G-E No. 5 FLASHBULBS

"My assignment was to photograph the actors in a high school Western play," writes staff photographer Larry George of the Indianapolis News. "I wanted a picture that would capture the mood of the play and show the principals in some dramatic way.

"It was late at night, during rehearsal. The only existing light came from a few overhead lights on stage. I decided G-E No. 5 Flashbulbs would be perfect for the job. I placed four of them on extensions, all sync on camera... three on the background group and one side-lighting the principal subject in the foreground.

"My camera was a 4x5 Speed Graphic with wide-angle lens, placed at floor level. Exposure 1/50, f22. G-E No. 5's again proved to be the perfect solution to a tricky lighting problem."



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Get more information. Circle 452, page 85

David B. Eisendrath, Jr.

WORKING PHOTOGRAPHER

More comments on camera care: tips for keeping out of a jam

Last month, I began a discussion of tips on camera care from Marty Forscher—the favorite camera repairman of so many professionals. Marty's a strong believer in preventive medicine, and I outlined his suggestions for checking view cameras and miniatures on a regularly scheduled inspection period, whether the cameras have been used often or just occasionally. A view camera which is used with extreme wide-angle lenses especially gives the bellows a tough time (even those rubberized superwide bellows that make the Sinar such a joy to use) because of the twisting and bending at the seams. A regular inspection in a dark-room with a small pen-light or a 25-watt bulb on an extension cord will save you many a re-shot job. If you catch them early enough, a good patch can be made with Scotch No. 33 plastic electrical tape. This is thin enough to reinforce corners and folds of the accordian pleat, and won't crack. When I apply it to bellows I like to quickly run a warm 100-watt bulb over it to make it stick extra tightly. This tape doesn't ooze much from the edges.

Even when in the field on a picture assignment that may run several weeks I make regular checks of equipment against light leaks.

Who's watching the storage?

It goes without saying that if you are putting a seldom-used piece of equipment away for a few months when it may be used again, it is much smarter to put it away clean and in repair. Forscher reports a common emergency arises when a job comes along requiring the use of a camera packed away, which is then "de-mothballed" only to find that it requires two days of repair to make it serviceable.

Many industrial departments and commercial studios make a point of storing cameras in plastic freezer bags or in one of the transparent food wrappings so you can see what's in the package. This is a good inducement to be sure the equipment is put away clean, too. If the equipment may be stored away for many months, it might also be wise to pack some containers of silica gel along with it to keep dampness out of the equipment.

Lens care

It's also a wise investment to store lenses with lens caps on—this helps prevent chemical and dirt deposit. Of course, lenses should be cleaned for storage as well as for every day use.

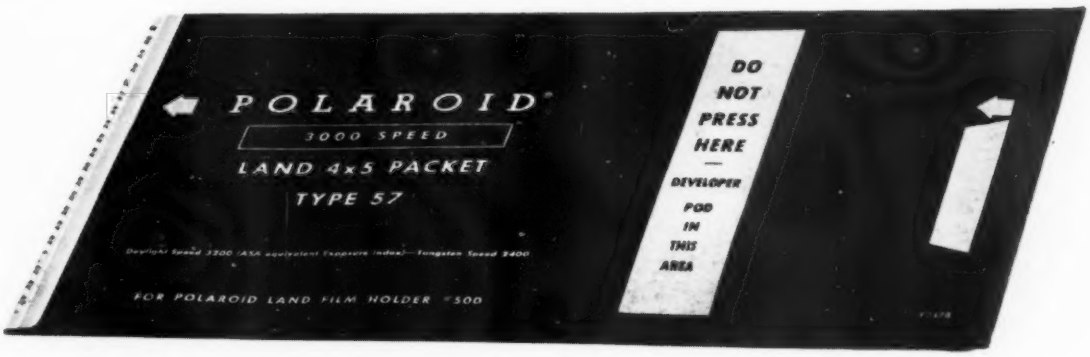
Lenses should be cleaned carefully with lens tissue, *never* with silicone eye-glass tissues. A few drops of lens cleaning solution may be used as sparingly as necessary. Unless a lens is very old and has cement or paint chips in it, there is no need to ever take lens elements apart. Leave that to a serviceman.

Sometimes a camera gets too hot, (is left in the sun or near some radiator) and the lubricant that has been put in it may run, puddle up somewhere and make the mechanism hard to operate. If you have such an emergency and have to clean camera parts, avoid the use of carbon tetrachloride—the fumes can kill you—and cleaners whose vapor may affect film. Forscher says they use chlorothene for cleaning.

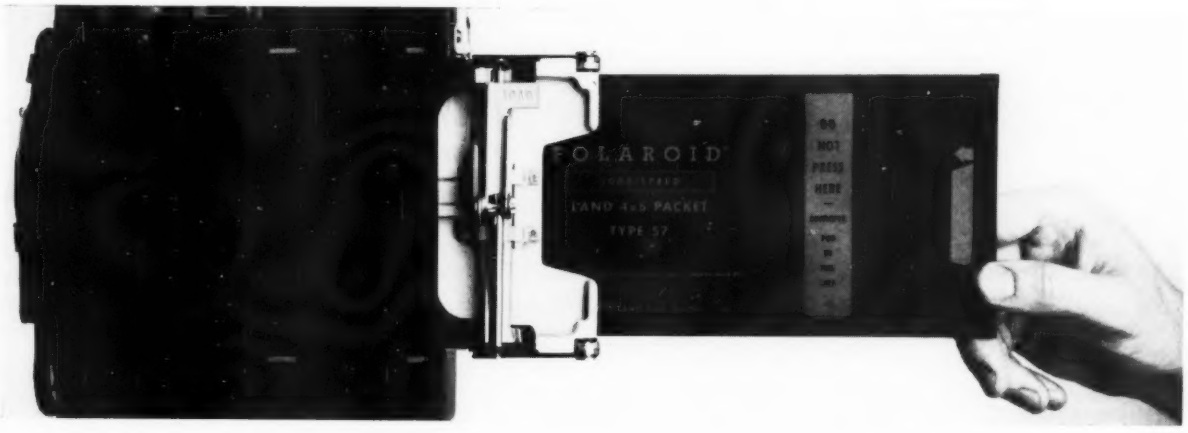
A classic disaster that befalls cameramen (and often, industrial cameramen) is dropping a camera into a lake or ocean or some other large body of water. Now just getting a camera damp in the rain is one thing (a good wipe off is usually sufficient) but a complete emersion is often near-fatal. Most people ask what they should *have done;* Marty says it's best to know beforehand, what you *should do* before the accident happens. Anyway, if you should dunk a camera and recover it (what's the matter you don't have insurance?) here are

(*continued on page* 18)

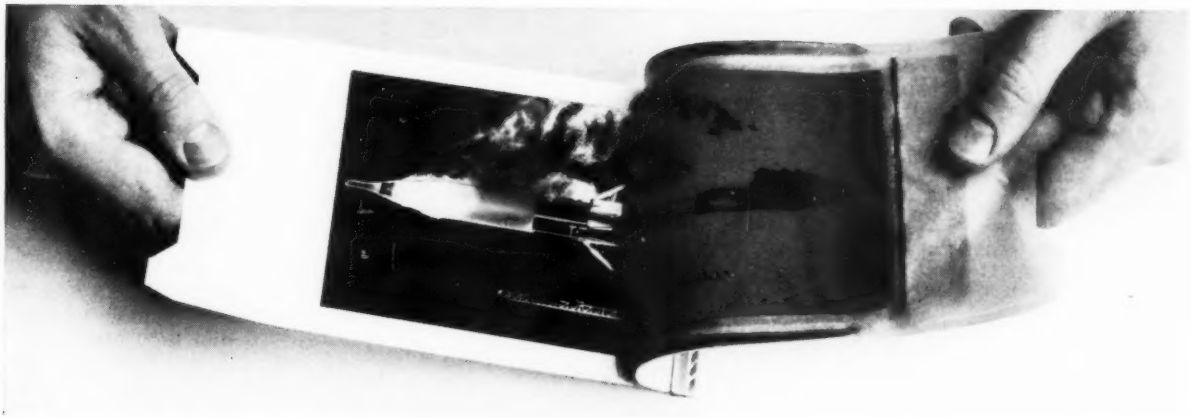
This is the new Polaroid Land 4 x 5 film pack.



It fits into the Polaroid Land film holder.



Adapts 4 x 5 cameras to instant photography.



Shoots at 3000 A.S.A.; prints in 10 seconds.

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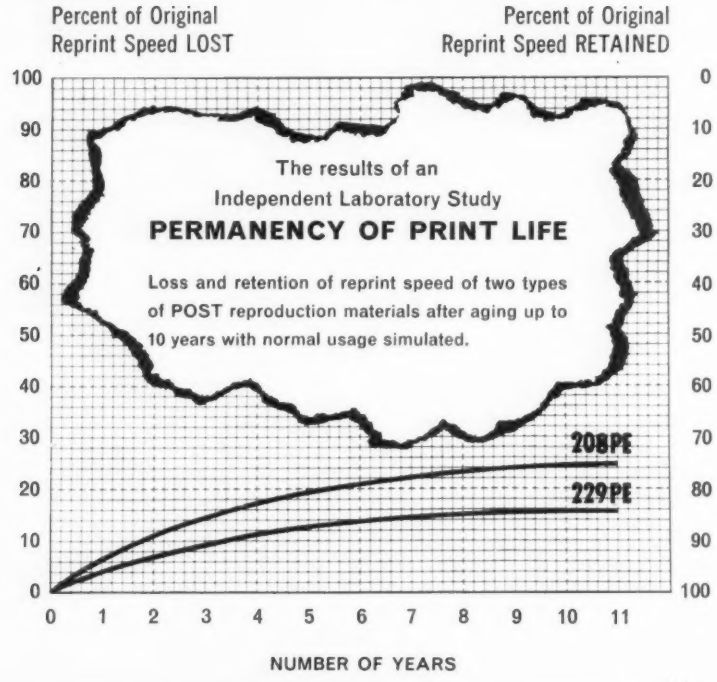
REPRODUCTION TRENDS



The graph above is an interpretation of independent lab reports demonstrating the relative permanency of Post sensitized materials.

Independent Lab Tests prove permanence of Diazo and wash-off films

Why research? The extremely rapid development of diazo technology has actually outpaced the industry's ability to put in its customers' hands complete information on the multitude of improved sensitized products now available.

What's new? Because of the outdated conception, held by some, that the diazo process produces only cheap, throw-away prints, Post retained an impartial, independent testing concern to verify the life expectancy of Vapo Tuf-Tex (diazo) and ReproTrace (wash-off) polyester films, which are used frequently as reproducibles or "duplicate originals."

Ten years of simulated use? Procedures involved accelerated aging, filing, refiling, as well as print runs of varying length and speed. Tuf-Tex and ReproTrace proved well able to maintain an effective degree of image density under trying conditions.

Proof of the testing. For your copy of the complete folder detailing conditions and results of these first impartial tests, plus an additional free Post Selector Chart of Diazo Materials, write to Frederick Post Company, 3660 North Avondale Avenue, Chicago 18, Illinois.

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Get more information. Circle 473, page 85

WORKING PHOTOGRAPHER
(*continued from page* 16)

some salvage tips. If in salt water, flush with clean fresh water as soon as possible. Then remove lenses and try to blow out water with a compressed air hose at the nearest service station. Or try a home hair dryer, being careful not to get too much heat near cement or lenses.

Remove the cover of Compur-type shutters, the right-hand side-plate of a Rollei and try to remove as much water as possible. Some repairmen suggest soaking the camera in alcohol or benzene but Forscher thinks this is dangerous because of plastics and cements used in modern equipment. The whole point is to dry as quickly as possible to prevent rusting. Then get to your repairman quickly.

Industrial photographers run into many rugged conditions as far as cameras are concerned. Many foundry areas are filled with soot, grit and abrasives. If you find that some small particle is making your lens mount or winding mechanism work hard, stop using it lest the soft metal be completely ruined. Sand is a common gremlin for really eating into parts. Industrial photographers also have problems with flying arcs, sparks, molten metal, abrasive and corrosive chemicals. Use of a clear glass filter over the lens (I use the Ednalite Skylight filter, it's clear, thin, optically flat) will protect against flying ships of metal or molten slag. Marty has seen lenses eaten through by such shrapnel.

This is why industrial photographers must be careful to have frequent servicing periods scheduled.

I asked Marty if industrial photographers' cameras were usually in worse condition than those of other types of lensmen.

Marty said no. Fashion photographers were hell on Rolleis and Hasselblads, he said. They often work from low angles on the beach and are constantly getting mechanisms jammed on grains of sand.

Rice pudding

Worst trouble though, he told me, was with wedding photographers. They always get caught in the shower of rice. Small particles and rice dust sifted down into the mechanism, got caught in the gears, got mashed into the camera lubricant and made a stiff paste, calling for frequent cleaning. And when champagne got spilled, too . . . but by this time I was out the door and on my way to a dusty fertilizer factory.—THE END

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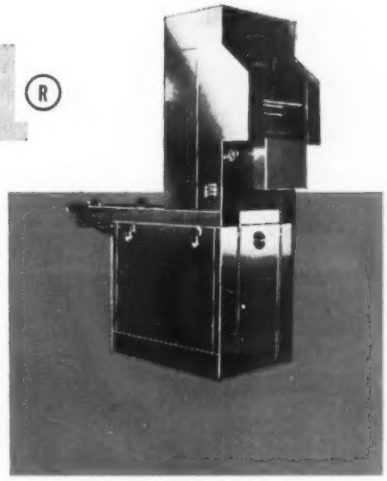

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Get more information. Circle 405, page 85

Edward R. Farber

ELECTRONIC FLASH

New American Standard for EF; it may end 20-year war of words

For over 20 years, photographers, engineers and manufacturers have confused each other with conflicting definitions of the simplest and most basic terms concerning electronic flash. Now, after five years of patient discussion and a few heated arguments, an American Standard for "Measuring and Designating the Performance of Electronic Flash Equipment" is in the process of being approved.

Although in general this should be good news for buyers of electronic flash equipment, remember that no one forces a manufacturer or importer to use the standard. Furthermore, use of the standard may sometimes confuse comparison: To quote the ASA Subcommittee Chairman, J. A. Van den Broek, (Sylvania's Argus Div., Ann Arbor, Mich.), ". . . in some instances the standard is unavoidably more favorable to some types of equipment and to the manufacturers thereof, than to others."

What the standards mean

Therefore photographers must thoroughly understand the definitions, and the principles behind them, lest they be trapped by misinformation. In subsequent issues of PMI, this column will try to review the new ASA standard definitions of *electronic flash equipment, electronic flashtube, quantity of light, coverage of light, flash duration, recycle time, beam candle power second, peak voltage* and *energy storage capacity.*

Back in 1956 when Harry Parker (President of the American Speedlight Corp.) began as Chairman of the "Task Force Committee on Electronic Flash Standards"—only four definitions *(strength, coverage, duration* and *recycle time)* were to be included in the standard. Parker had set down some good and comprehensive definitions of these terms years before, but agreement is not an easy thing to get. For example, back in 1948 Parker and this writer had tried to set a standard high-voltage cord and plug.

Developmental problems

A meeting of nine manufacturers was held in Chicago to promote the idea. Result: Only Ascor and Strobo Research bought the common design. Then, because of patent and circuit problems, those companies could not work out an interchangeable lamp.

While these two manufacturers were recommending extended development to secure normal contrast with short duration, high voltage flash units, Eastman Kodak, on page two of its February 1948, *Kodak Handbook Notebook News* stated: "It has been popularly believed that the electronic flash tends to reduce the contrast of negative materials. Actually this is not true. Some manufacturers have made extravagant claims as to the light output. As a result the negatives were somewhat underexposed so that longer development was needed in order to use the normal grades of paper in printing. Such overdevelopment is unnecessary if adequate exposure is given."

Here we had equipment manufacturers talking about reciprocity failure, and a film manufacturer denying such a thing existed. Thus it was lack of adequate knowledge and means of measurement that made definitions difficult if not impossible. But Parker persisted and his committee now has the new standard readied.

Even the new standard will not solve everything. Recent puzzlers are the contradictions appearing in tabulations and advertising where identical flashtubes in similar circuits, reflectors and protective covers give light rated at anywhere from 5500 to 6800K. This subject is not covered in the standard.

Excellent background material in

(continued on page 22)

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ELECTRONIC FLASH

(*continued from page* 20)

electronics is published by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Ask for a free list—Price List 82, Radio, which also covers electronics.

Milton Schwartz manufactures an electronic flash he calls the Skylight unit. It has 20 light sources in reflectors mounted in a bank and is used particularly for color where a soft skylight effect is desired. It has been a source of delight to him that he can detect the photos made with his equipment by examining the highlights in the subjects' eyes. The 20 pinpoints prove it. But the other day he was examining an ad in *Life* with disapproval. He promptly ascertained who had made the picture, went over to the photographer's studio, and replaced a defective flashtube that the photographer himself had not even noticed was missing. And how did Milton know? He counted only 19 pin points in the model's eye.

Right man, wrong book

The recent issue of *Camera News of West Germany* has a picture of this writer "dutifully" attending a cocktail party at the Photokina in Cologne, Germany. The cut lines indicate that the writer is a member of the staff of a certain other magazine that is designed to appeal to industrial photographers. But it's completely and absolutely untrue. Only PMI brings you ERF.

The semiconductor field has now come up with small and somewhat reasonably priced substitutes for trigger tubes. Silicon controlled rectifiers (referred to by the knowing as SCR's for use in flash units are about ½ in. long, ¼ in. in diameter, and sell for about $15. (G.E. C11B for example). Schiebe Enginering of Burlington, Wis., is already incorporating such in their AC Portable (Producer 300) for production school photography. SCR's should eliminate the eccentricities sometimes experienced with some gas-filled trigger tubes. They will also be useful in radio and photo electric control of flash lamps.—THE END.

PMI Goes to Bed Early

So mail early to get your news in FYI and Coming Up. Right now you should be sending items for April and May 1961.

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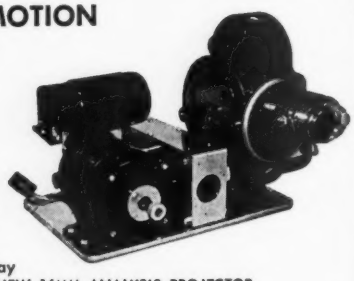

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LETTERS

(*continued from page* 14)

batch of color film we get to determine exactly how it is reacting. A grey scale is shot under controlled conditions and we know exactly by graphing the results how that film will best serve our purposes.

One color film on the market today was supposed to be so good that they claimed better greens and yellows with higher speed and higher film resolution, and they are right except that they do not mention that they have trouble processing the film without getting mottle and neither can they balance a neutral grey scale with this film or any of their other films on the market at the present time except Ektachrome E-1.

I would sincerely like to see an article published on color films and color printing processes. This article would point out to the photographer the characteristics of each color film and color print material in the following way:

1. How accurately will the material reproduce a grey scale? Are there any hue shifts in the highlights, middle tones or shadow areas?
2. What are the color deficiencies of the film?
3. How good is the resolution of the material?
4. How consistent is the quality of the material from emulsion to emulsion? Do you need much filter correction?
5. Are there any problems encountered in processing?
6. What are the advantages of this product?

Perhaps film manufacturers do think we are getting too demanding of their products, however, we are not going to let them rest until we get a color film that will perform to the list I mentioned above.

I hope that someday in the near future I will see an article on color materials in your magazine. I would like to see graphs of grey scales shot with the color material you are testing.

Rolan Duffield
Department Head
3-D Color Photography
Hallmark Cards, Inc.
Kansas City, Mo.

Color films are like people, none of them is perfect, but most of them can be pretty appealing given the proper conditions. PMI *has published data which describes precisely the color shifts of a color film and*

(*continued on page* 29)

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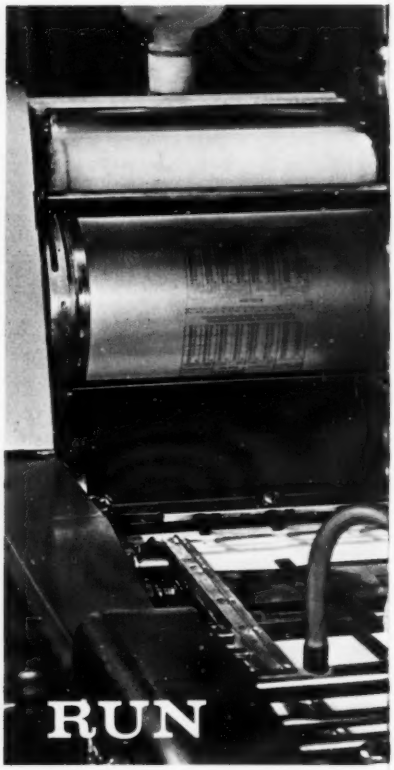

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LETTERS

(*continued from page 24*)

which analyzes the various ways in which color film falls from perfect grace. We recommend it to all. (Color Accuracy? Dreamer!, Lloyd Varden, May, 1959.) *In defense of film manufacturers, it must be said that they buck not only massive practical problems in pushing up the quality of color film, but that they also face a theoretically unassailable ceiling on such matters as color accuracy.*

Actually, we would like to print the information reader Duffield lists in his six point program, but we are not equipped to sample and test films with scientific rigor.

Finally, of course, the photographer must choose his material on the basis of his aims and his taste from what is available on the marketplace. We think that in the long run the easiest way to do this is with objective tests. While we have no statistics to support the viewpoint, we think that the more careful and more unvarying such tests are, the easier a time the photographer is going to have. Reader Duffield would probably concur on this. Manufacturers are more sensitive to reasoned criticism and complaint than many photographers suspect. Herewith is the consideration given by one to Mr. Rolan Duffield's letter.—Ed

To the Editor:

With the possible exception of the man behind the camera, no one is more keenly aware than the photographic manufacturer of the exacting demands being made of photography in the 1960's. A company, such as Eastman Kodak, for example, maintains a large field force of professional technical representatives whose responsibility it is to keep the manufacturing and sales divisions of the company in close contact with the needs of the trade. . . .

Those familiar with the basic characteristics of three-color photographic processes can appreciate the fact that the eye and the color emulsion do not always "see" color the same way. Other factors being equal (optimum quality control from original exposure to finished print or transparency), there is still a chance that slight discrepancies or anomalies in color reproduction may appear. But other factors are not always equal.

Color film, perishable product

(*continued on page 91*)

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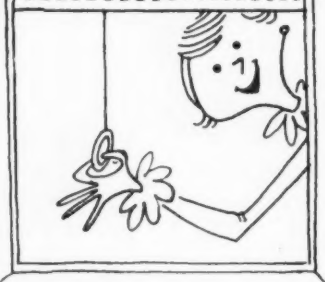


Get more information. Circle 421, page 85

Samuel Lang & Leonard Zoref

INDUSTRIAL COLOR

New ideas from manufacturers make one do the work of two

On the chemical shelf of many a darkroom you will find a different paper developer each intended for a different manufacturer's product—because the photographer has never checked and compared the different working formulas. The differences in many cases is miniscule. The major advantage to compatible solutions for the small user is convenience rather than actual dollar savings on the chemicals themselves; while the large user cuts labor costs when he can make a chemical mix which will serve several processes.

It took quite a bit of hounding by the color labs before Kodak finally came out with some compatible chemicals for the different color processes. Actually, the manufacturer gains by it also because he has less items to manufacture and stock but the same gross amount of chemical is sold and used. We have all gained by the fact that the C-22 and P-122 stop baths are the same; so are the fixers for Ektachrome and Ektacolor. A comparison of Ektachrome and Ansco formulas will show that both hardeners are the same. Those of you who still process E-1 will improve your results by using E-3 secondaries but you must use the proper first and color developers.

Color filters for B&W

Simmon Brothers, Inc., (Omega) recently released some very useful information on the compatibility of their Chromega enlarger and the different variable contrast papers. There is no reason why the filters you are using for color printing shouldn't work equally well for black-and-white. In fact, you should actually get sharper prints when your filters are used above the negative rather than below—as is often the case with variable contrast filters.

It is important that you consider the following as approximate comparisons only. You might have to adjust them somewhat for your working conditions:

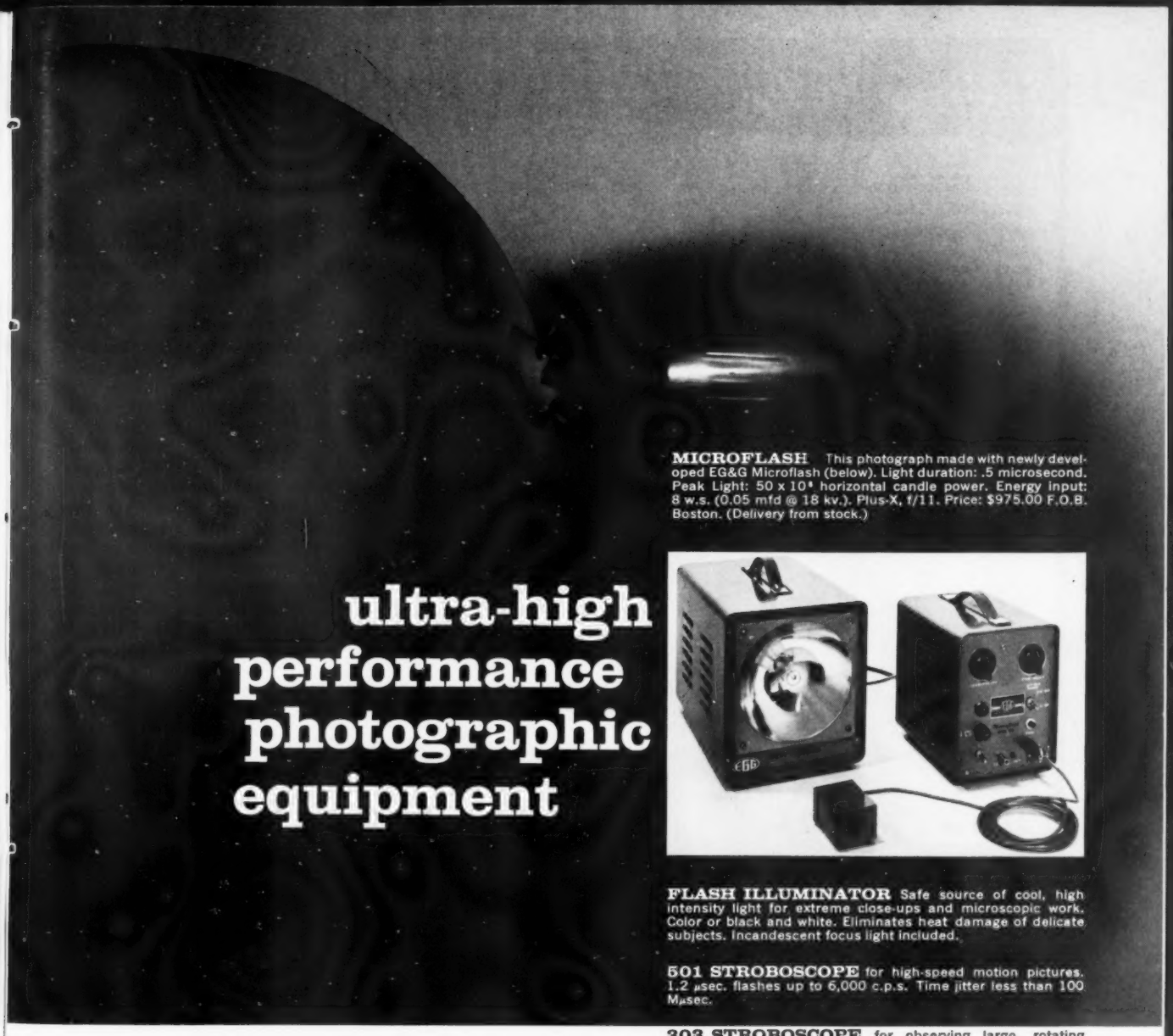
Kodak Polycontrast and Polylure Paper		DuPont Varigram Papers		Ilford Multigrade Paper	
Polycontrast Filters	Chromega or CC*	Varigam Filters	Chromega or CC*	Multigrade Filters	Chromega or CC*
4	120 Mag.	10	60 Magenta	7	110 Yellow
3½	90 Mag.	9	45 Magenta	6	90 Yellow
3	60 Mag.	8	30 Magenta	5	70 Yellow
2½	40 Mag.	7	30 Magenta +45 Yellow	4	50 Yellow
2	30 Mag.	6	20 Magenta +45 Yellow	3	10 Yellow
1½	15 Mag. +15 Yel.	5	10 Magenta +45 Yellow		
1	30 Yel.	4	60 Yellow		
		3	90 Yellow		

**Kodak or Ansco Color Compensating Filters, camera quality or printing foils.*

Contrast adjustment has never been too much of a problem in black-and-white printing: there are many simple methods of adjusting contrast; including variable contrast papers, different contrast grades of conventional papers, developing times and concentrations for either negatives or papers—and the choice of a diffusion or condenser enlarger. Combining several of these variables gives the black-and-white printer control, which is not available to the color printer.

At present, there is only one contrast grade of color printing material available in this country. Agfa has paper of different contrasts, but their quality at present is surpassed by Kodak's materials. Increased development has little contrast effect on Ektacolor films and papers. Increased development of Kodacolor or Ektacolor films will give you added density but little additional

(*continued on page* 32)



MICROFLASH This photograph made with newly developed EG&G Microflash (below). Light duration: .5 microsecond. Peak Light: 50 x 10^6 horizontal candle power. Energy input: 8 w.s. (0.05 mfd @ 18 kv.). Plus-X, f/11. Price: $975.00 F.O.B. Boston. (Delivery from stock.)

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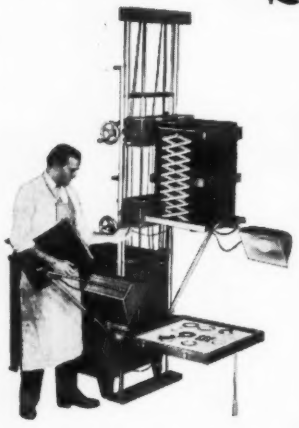

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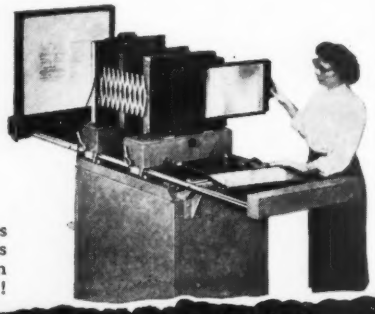

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Get more information. Circle 415, page 85

INDUSTRIAL COLOR

(*continued from page* 30)

contrast. The only other alternatives are photographic or electronic masking and that requires considerable skill or expensive equipment.

Most processing instruction sheets specify a washing time in minutes for a given minimum flow rate but until the following information was available, there was nothing on the many variables possible. No specifications covered different tank sizes or compensations for insufficient or excessive flow. While reading a Kodak bulletin on a new internegative material, not yet available, the following was noted:

The flow rate in a 3½-gal. wash tank should be at least 2¼ gal. per min. This is a minimum figure—3 gal. per min. is recommended. For other sizes of tanks, a unit rate of 0.3 gal. per min. per sq. ft. of film is the minimum, and a unit rate of 0.4 is recommended.

"If small air bubbles tend to form on the film, insert an aspirator (filter pump) in the wash water line and adjust it to permit a steady flow of air into the water."

A water flow meter would solve the problem for those of you who are super-critical and have the problem of a very erratic water supply. Many industries use these meters for accurate liquid measurements. They can be set to turn off automatically after a given number of gallons of water have passed through the meter.

In many areas, water filters are necessary due to impurities and sediment but if they are not changed at the proper time, the water pressure drops too low and insufficient washing results. Some of the larger filters have provisions for two pressure gauges so you can check the differential on the incoming and outgoing water and that way know when it is time to change filters regardless of water pressure. We used to change filters when the flow dropped below a given number of gallons of water per minute but found this to be a fallacy due to pressure fluctuations caused by our air-conditioners, toilets, as well as other processing units.

If the pressure of the water entering the filter unit containing new filters is 60 lbs. and leaves at 50 lbs., we have a 10-lb. differential. This differential will not change very much with a change in pressure. We change the filters when there is a 30-lb. differential, which is cutting the water supply by about 50 per cent.—THE END

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Get more information. Circle 437, page 85

AN EDITORIAL

WHY AGONY IN THE AGORA?

This publication exists as a medium of exchange for photographers and graphic arts workers employed by industry. That you know. What you may not be familiar with is the agony with which a few firms allow their photographic personnel to part with information for exchange. This puzzles us, because in most cases we feel that an industrial concern has everything to gain and nothing to lose by entering the idea market. ■ It turns out that this notion is not ours alone. We quote from Vol. 2 No. 2 of the Librascope Technical Review: "An incentive program designed to spur activity among Librascope employees in the preparation of technical and semi-technical papers and articles was recently authorized by company President W. E. Bratton. In announcing the new program, Bratton stated that up to $150 will be awarded to employees whose articles are accepted for publication in trade or general magazines or whose papers are presented before technical societies. Benefits to an individual author, other than the cash involved, are even more important, Bratton pointed out. 'Writing for publication enhances an individual's reputation and personal prestige, both within his company and his profession,' he said. 'It also extends his knowledge of the subject matter treated and, through research required in preparing the paper, an author becomes more familiar with the literature of his own field. . . . Finally, we believe this program provides an efficient vehicle for stimulating the exchange of news and knowledge which may help generate further scientific progress within the industry.'" ■ Perhaps it is the advanced nature of Librascope's work that leads them to take what we feel is a most enlightened step. Librascope is a division of General Precision, Inc., which concentrates on computers and process control systems. To Mr. Bratton's excellent precis, we can only add that a well-thought-out piece of photography or writing does anything but detract from the prestige of the author's firm.

The Editors

A PROGRESS REPORT

8MM SOUND

The marriage of motion picture and metal oxide film has made acceptable quality 8mm sound a reality for the amateur. Now the motion picture industry sees it as a natural for many non-theatrical applications where 16mm is now king. Some view the 8mm sound-striped release print as the beginning of a revolution that will end with the motion picture being as common as the paperback book. Whatever does happen, the industry is gearing up for professional 8. Here's a review of where it stands at the moment

Last year 8mm sound was just a gleam in the eyes of photographic manufacturers. At MPDFA in St. Louis, 8mm sound projectors made their official debut while Fairchild was preparing to introduce the first 8mm sound-on-film camera. Today, 8mm sound is about ready to take its place in the world as a toy for the amateur and a tool for the professional. Everyone has an idea of what *could* happen when the blessed event takes place but nobody knows for sure just what *will* happen. Here is a report on some of the things that *have* happened.

Among the areas in which interest is fairly intense is the industrial field. Here, 8mm sound offers a great deal of potential in making current assignments easier and in making wider photo coverage possible. For example, many firms with multi-plant operation use a film report to keep various key people informed on what is happening throughout the system. These films are currently on 16mm. Since they are shown to small audiences and the content is more important than the film quality, this information could be put on 8mm sound without any loss of effectiveness. Not only would the films be cheaper but the equipment would be easier to transport and cheaper to procure. Instead of one 16mm projector in a department, there could be several 8mm projectors for each section which would be available at the most convenient times.

Field reports and sales presentations could be put on 8mm. A salesman or field engineer could carry an 8mm projector without too much trouble compared to the size and weight of a 16mm sound projector. In some firms, where non-photo people are given 8mm amateur-type cameras to record field work, this could become a more valuable tool by adding sound and showing the film to interested parties.

In short, 8mm sound has arrived —for the amateur. And while it holds bright promise for the non-theatrical film industry, including industrial films, there are too many problems to be solved, too many kinks to be ironed out before 8mm sound will provide the economy, quality and widely-available means of projection to make it a generally useful tool for professionals.

How soon these hurdles will be overcome is anybody's guess. The most important one is already out of the way, however: industry

leaders have faith that 8mm professional sound will come, and are taking steps to hasten the day.

First things first

In virtually every phase of a movie program, 8mm sound can be used with a resultant saving of space and money, savings which would start with the relative costs of projectors to the relative costs in mailing film from the library to the user. The current feeling is that while 8mm will not supplant 16mm for quality work or for showings to large audiences, it will supplement the standard 16mm program for use where portability and economy are comparatively more important.

In terms of basic importance, perhaps the work done by the special committee on 8mm sound of the Society of Motion Picture and Television Engineers (SMPTE) should be considered first. This committee is attempting to establish standards for the industry without which no real wide-scale activity can take place. These standards are in the preliminary stage but they indicate the direction taken in the photographic industry.

Six standards are currently under study. They include:

8mm Flutter Test Film, Magnetic Type, specifying a 3000 cps magnetic sound test film to determine the amount of flutter in 8mm sound reproduction systems;

Flutter might be described as a non-uniformity of motion of a sound track past a pick-up at a rapid rate. In terms of a movie sound track, this might be a change in speed from the standard 24 fps to 22 fps to 26 fps to 24 fps all within fractions of a second. This effect is similar to *wow* but takes place within a much shorter time span.

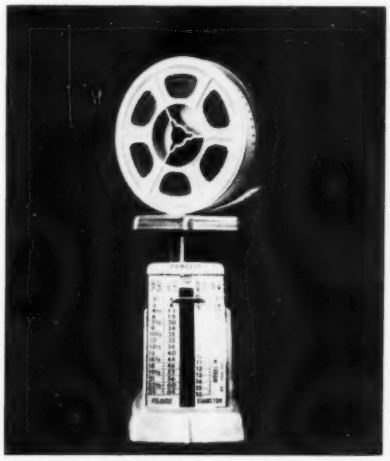
8mm Azimuth Test Film, Magnetic Type, specifying a test film with a magnetic sound record to be used for aligning the azimuth of magnetic heads on 8mm magnetic recording and reproduction equipment. A sound head which is improperly aligned will not cover the magnetic track completely so that some of the sound will not be recorded or played.

For best sound recording and playback, the sound head must be exactly 90 degrees to the film. Any deviation in this angle is reflected in a sound which varies from the standard sound. Thus, by using a known track, any deviation will show up in a sound frequency different from the standard frequency. This frequency deviation can be measured by using an oscilloscope.

Another sound standard lists a *8mm 400-cycle Signal Level Test Film, Magnetic Type,* specifying the signal to be used in controlling magnetic sound recording levels. It will also help standardize signal-to-noise measurements on 8mm magnetic sound systems.

The other standards cover the *Magnetic Sound Record on 8mm Motion Picture Film,* specifying the lateral location and dimensions of the sound record on the film; *8mm Multi-frequency Test Film, Magnetic Type,* which specifies a multi-frequency magnetic sound test film for use in standardizing the replay chain; and finally, *Magnetic Striping for 16mm Motion Picture Film, Perforated 8mm 2R-1500.* This indicates the location and dimensions of the magnetic striping materials applied to 16mm motion-picture film with two rows of 8mm perforations.

There seems to be agreement on a basic standard, namely, how long should the distance be between the single frame and the corresponding sound track. This has been set at between 52 and 56 frames. The distance is the same physical distance as with 16mm films but the number of frames, of course, is twice the number of 16mm frames. The 4-frame difference arises because one is based upon an optical sound track and the other on a magnetic sound track. Since the actual difference is about an inch, this can be adjusted in practice by modifying the loop length. Virtually all 8mm projectors and sound attachments use this standard except the Bolex Sonarizer which as of this writing still has a 118 frame difference.



Basic plus for 8mm *(left)* over 16mm is that the former requires only a fourth the material for the same screen time. But there's more to the story . . .

COST COMPARISON

THE FOLLOWING REPRESENTS INFORMATION RELEASED BY THE EASTMAN KODAK CO.

MATERIALS COST of a magnetic sound film per 3 min. of screen time. (No editing, no duplicates. Camera film is shown in the projector.)

	16MM	8MM
FILM	$8.60 (100')	$2.85 (50')
PROCESSING	4.25	1.75
SOUND STRIPING	6.00	3.00
	$18.85	$7.60

PRINT COSTS for a 10-min. color film (minimum of 36 prints) est.

	16MM OPTICAL SOUND	8MM MAGNETIC SOUND
PRICE PER PRINT	$29.79	$20.29

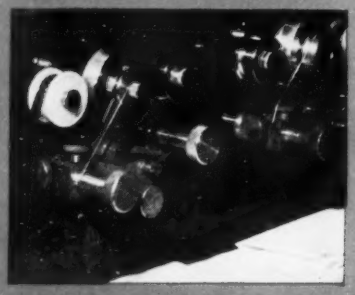
PROJECTOR COSTS	16MM	8MM
KODAK SOUND PROJECTOR	$459-$6342	$345

MAILING, SHIPPING STORAGE (but not handling) est.

16MM	8MM
100%	25%

ONE METHOD USED TO ADD SOUND TRACK TO 8MM FILM

The oxide striping may be either liquid (shown here) or tape laminate. Liquid is more permanent and offers greater economy since it can be applied to both edges of double 8 film at one time. Striped film requires about 10% more space on reels, 360 feet of sound fits on a 400-foot reel, 20 feet fits on an 800-foot reel, etc.



This machine, at Frederick F. Watson, Inc., New York, is used for applying tape laminate to film. The worker is shown adjusting the roller head for optimum contact and adhesion between tape and film.

Everett Hall of Frederick Watson, Inc., checks the sound stripe for evenness, correct placement. On 8mm magnetic sound, this stripe measures 30/1000 of an inch and is 1/1000 of an inch from the edge.

While the most unusual development in 8mm sound has been the Fairchild camera, professional interest centers about the projectors. The basic reason is that 16mm quality is still superior to 8mm in terms of screen brightness and sharpness. Second, most in-plant sections doing movie work have 16mm equipment which is of professional quality compared to most 8mm equipment now available. Third, 8mm is still not suitable for large audiences. Most plans call for using 8mm when there is a small group, say ten or twenty, who can watch a fairly small screen image. Finally, shooting on 16mm offers a choice of projection sizes: 16mm for large groups, 8mm for small.

Sound is applied to 8mm film in either of two ways, liquid or laminate. The liquid system involves passing an edge of the film through an oxide solution which adheres to the film. Under the laminating method, a stripe of magnetic tape 30-mils wide is applied to one edge of an 8mm film. Problems at this stage include proper placing of the sound track, about 1-mil from the edge of the film, and the permanence of the laminating process. According to some sources, the liquid method is most practical, being easier to apply and more lasting.

Practically any processed 8mm film may be sound striped. In some small operations, it may be more practical to take the pictures on 8mm silent film, edit it and then apply a sound track to the edited version. This is extremely practical where no in-plant movie work has ever been done but where the economy of 8mm sound makes such work practical now.

The next big question mark in the 8mm sound picture is the comparative quality of 8mm sound versus 16mm sound. There is no doubt that inherently, 16mm sound is superior. For one thing, the sound track is wider, 50-mil or 100-mil, depending upon the type used. (A mil is 1/1000 of an inch). Then too, this track travels at twice the speed of 8mm track for any given frame speed. In tape terms, 16mm travels, at 24 fps, about 7½ inches per second whereas 8mm travels at only 3¾ inches. The 8mm track is only 30 mils and is only about 1 mil from the edge of the film; and more vulnerable to damage.

Money, the well-known root

This is all theory, however. In actual practice, the necessities of marketing have made it necessary to use 16mm equipment which some people feel is inadequate in terms of the potential quality possible with 16mm sound. It is the basic equation of quality versus price.

Most 16mm projectors provide sound reproduction on the order of 100 to 7000 cps with reasonable freedom from distortion in the upper ranges. A fairly good tape recorder at the same tape speed (7½ ips) can provide about 50 to 12,000 cycles. The alleged low quality of 16mm sound reproduction by existing projectors breeds sloppy lab practices in the processing of optical sound tracks. According to the lab people, price is an important factor and they cannot afford to offer consistently top quality at competitive prices. In short, despite the quality potential of 16mm sound, the commercial aspects have made necessary the acceptance of lower quality sound reproduction.

In practice, this means that the current standard of 16mm sound is about equal to that which can be attained by a 30-mil 8mm system. Therefore, while the best 8mm sound may not equal the best 16mm sound, there will be no practical difference for most purposes. The existing 8mm sound projectors are capable of fairly good reproduction but are relatively high priced. Many people feel that in the future, the demands of a mass market will see cheaper projectors with sound not as good but still

adequate for most purposes. Very often, the last 10% margin of quality accounts for about 1/3 the price. Unless a mass market can be developed, 8mm sound will remain expensive and the chances for technological improvements will be less because of the small production runs which make such improvements uneconomic.

In a sense, this is what has happened to 16mm. About 45,000 16mm sound projectors are sold each year at prices ranging upwards of $400. By contrast, over 700,000 8mm silent projectors are sold each year, at prices from about $50.

Mass production

One authority in the field says that even if he had the entire market to himself, a manufacturer could not afford to set up mass production facilities for 45,000 units. Not so with a market of 700,000 units. A number of manufacturers can afford to tool up for such a market. Thus mass buying is the key to quality at a price in motion picture projectors.

Most sound on 8 projectors would be sold to home users, but the availability of a high quality unit at a relatively low price would induce many non-domestic buyers to install projection equipment, according to some authorities.

This would open vast new outlets for non-theatrical professional films. And the lower cost of projection equipment would broaden the application of motion pictures to in-plant use. After all the discussions on possible uses and technical qualities, there is still the paramount question of cost. Will the cost of 8mm be sufficiently low to pay for whatever sacrifice of quality is involved? Will the cost be so high that the advantages of portability and ease of operation become too expensive? No one knows.

Custom prices

At least two labs, General and Frederick Watson, will quote on 8mm work provided the orders are large enough. It is still too new to be a part of any labs regular service. No one knows just how big the market will be or how much of an investment will be justified. In essence, any price for 8mm work amounts almost to a custom price for the job, at the present time. The problem of the best type of equipment, the best method of printing, the best method of handling, has yet to be solved. It's like knowing that a baby will be born, but not being sure if it will be a boy or girl.

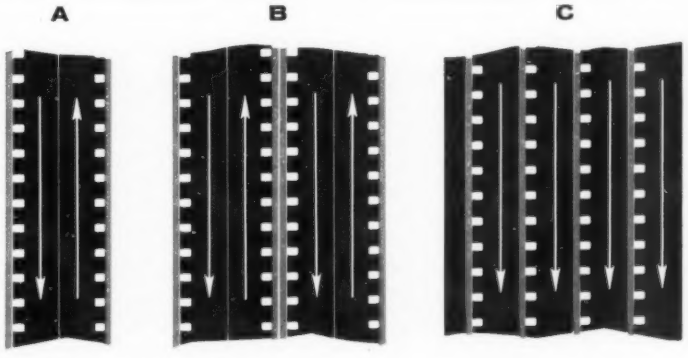
Printing Problem

A case in point is the problem of printing from the 16mm master. Is the best way to use a 16mm film, printing down one side and up the other, then slitting the film? Is it better to make 4 on 32mm film or perhaps 4 on 35mm film, leaving 3mm at one edge for handling? The use of 16mm requires the least investment in new equipment since all labs have 16mm equipment.

The current picture on costs is a paradox. Unit costs, per foot, are slightly higher for 8mm than for 16mm, despite the fact that there is twice as much film in a foot of 16. But because only half as much 8mm is needed for a film of any given screen time as 16mm, the cost for a release print is less. At 24 fps, 8mm film travels 18 feet per minute while 16mm travels 36 feet. If the cost per foot of 8mm is 10¢, a minute of screen time would cost $1.80. If 16mm cost 8¢ per foot, a minute of screen time would cost $2.88. The chart on page 37 will show this cost relationship.

The ultimate question as far as 8mm goes for the in-plant man is whether or not his firm should go into the field. What can he tell his management? Nobody has done much with 8mm sound yet and there are no concrete examples of what to do or what not to do. As far as we can tell, the first use of 8mm sound for industry was the color film Pan American Airways had made for showings with department store sales demonstrations of 8mm sound projectors.

This is one area where the ability of the photo departments to apply 8mm will determine how much will be done in this area. It offers the advantages of film where the use of 16mm was not practical either because of costs, lack of qualified people or limited audience. Remember that movies are basically for communication and that there is as much need for a short memo as for the formal report. Now as far as films go, the memo can be on 8mm.—THE END

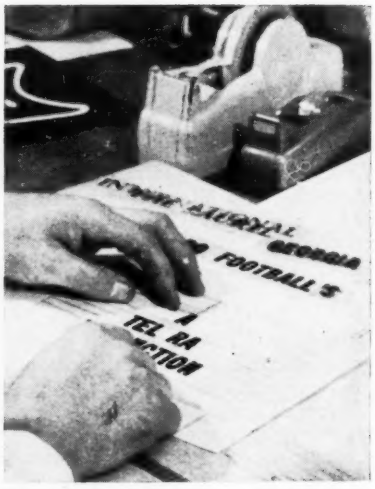


Which will it be? Here are three possible methods for printing 8mm sound films. The first **(A)**, is the standard 16mm film which is split after processing. This requires the least change in lab equipment. The second **(B)** is 32mm which is now used for 16mm processing. The 32mm is split into two 16mm rolls. This could be used for 8mm by splitting the film into 4 rolls. Finally **(C)**, there is 35mm which is handled like 32mm but which provides 3mm handling space. This could be the most efficient method but the heavy outlay in new equipment required makes this system unlikely except for very heavy market demand. In addition to the actual film used, the direction of printing has yet to be standardized. Shown here are one up and one down, two up and two down, one up, one down, one up, one down. These are only three of an estimated 16 variations with the three film sizes shown. Printing all frames at one time as with film travel in one direction makes possible greater uniformity of exposure. On the other hand, one up-one down system is now widely used because of sprocket arrangement on 16mm.

QUICK TITLES

One First step in making a Tel Ra title is exposing the letters onto high contrast 35mm film in this Fotowriter.

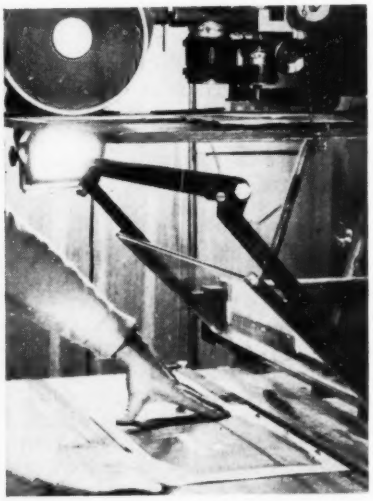
Two Processing lab for 35mm film comprises these bottles, one for developer, the other for fix. Drying is quick.



Three Dried film is positioned on 8½ x 11 acetate sheet clipped to a layout sheet. Words are taped in place.

Four Acetate sheet and photocopy paper are here fed through the exposure section of an Ampto "14."

Five Photocopy sheet is processed in copy machine. Tel Ra prefers using a two-solution unit, double development.



Six Final step is copying the title on high-contrast motion picture film, to be spliced into newsreel master.

A sports newsreel firm uses a photo lettering device and simple office copy machines to turn out titles in minutes at 1/5 the previous cost

Tel Ra Productions is a fast-moving Philadelphia motion picture house. They have to move fast because they specialize in sports news and features. The clients are TV networks and stations as well as armed service posts in the United States and overseas.

In the news business, Tell Ra's production manager Dan Wise says, "fast" is a relative word. He is willing to take a look at any technological advance that will help take the pressure off him—or apply it to his competitors.

The firm had been buying conventional titles from local commercial sources. Wise says that as a big user, he had always received excellent service and was more than happy with the results. But recently Tel Ra's reproduction service manager, Lou Cesarone, passed on an idea from a Philadelphia supplier, Poly-Graphic Service Corp., which would speed titling and drastically reduce its cost. According to Wise, the system is now in use and does just that. He says that Tel Ra can turn out sharp black-and-white or white-on-black titles, credits and bridges in minutes. He estimates that the savings over vendors' bills will run into the low thousands annually, to boot.

Equipment list

Tel Ra's equipment for this work comprises 1) a photolettering device 2) a single "font" of type on film 3) a photocopy exposing unit 4) a photocopy processing unit 5) a dispenser for transparent tape and 6) a supply of photocopy paper, high contrast 35mm film, developer, fixer and 8½ x 11 acetate sheets. Best results are obtained in subdued light, but no darkroom is required for the operations. Tel Ra does them in the film library.

While Wise counts on the titles to keep their original appearance for a few weeks, Tel Ra takes no pains to make them permanent.

First step in the process is photo lettering. The firm uses a Fotowriter, essentially a calibrated contact printer for transferring a negative alphabet to high-contrast 35mm film. The original alphabet is likewise on 35mm film and is supplied by Fotowriter. Tel Ra uses Anklor F (Anken) film for the copy. The operator puts the film in position for the first letter of the title, exposes it, then moves on to the next, exposes it, etc. until the title is complete.

Because the titles are limited for the most part to a single font, the operator can handle letter spacing almost from memory. He keeps a chart handy to remind him of the Fotowriter instructions.

When exposure is complete, the operator removes the film from the Fotowriter and develops it in two bottles containing the respective solutions. A quick shake to remove excess solution and the film is then ready for paste-up.

The operator places a sheet of clear acetate over a pre-ruled sheet of paper which serves as a layout grid for all standard titles. Guiding on this sheet, he lines up his title on the acetate and secures it with Scotch brand transparent tape.

He places the acetate sheet—now bearing the black-on-transparent title—on the high contrast photocopy paper. Looking at the acetate, the title is right-reading. The photocopy paper is Anken Many-Copy. For exposure, he sends this sandwich through the exposing slot of an Ampto "14" photocopier.

The operator then separates the photocopy paper from the sandwich and feeds it into the developer slot of an Anken 12-in. processor. This produces an image suitable for office copy work, but to obtain the crisp blacks needed for Tel Ra's application, the operator feeds the sheet through the developing section a second time. Next he sends the print through the fixer section of the Anken unit.

Final step is lining up the title on a pin register card for transfer to cine film on an animation stand.

Wise estimates that the cost of each completed title card averages one dollar, including materials and labor. Title cards formerly cost Tel Ra $5 to $7.50 each, while presenting no particular advantage for the simple, straightforward titles appropriate to Tel Ra's newsreel format. Wise thinks that the $4 to $6.50 saving will add up to $3000 at the end of one year.

No opaque

The advantage of using a transparent original and a high-contrast office duplicating paper is that exposure can be intense enough to drop the film background, sprocket holes and transparent tape into a dense black—without undercutting the sharp edges of the white letters. Unless opaqued or painted-in somewhere along the line, a paper paste-up would show objectional paste-up lines in the finished title.

For black-on-white titles, the Many-Copy print is backed with an unexposed sheet; the light setting on the Ampto "14" exposing unit is stepped up, and the additional copies exposed and processed as the original was. There is some diffusion in the paper base of the original and therefore the edges of the black-on-white letters in the copy are not quite so sharp, but the total effect is still readable and professional looking.—THE END

DON COTNER—Director

ROSE TOTH—Technical Secretary

EUGENE O. WELLS
Photographer

NILS LINDQUIST—Photo Manager

NATIONWIDE

The staff of the Graphic Arts Service Department of Nationwide Insurance, in Columbus, Ohio, includes: artists, a writer, a sound man, a cinematographer, a photojournalist. Important enough to have a building all their own, their work consists of holding up the visual end of company communications in a very large, widespread and unusual insurance outfit—via layouts, advertising, photographs, slides, filmstrips, sound tapes and in-company motion pictures

Nationwide is a most unusual insurance company. Besides the imposing array of insurance corporations that make up the Nationwide group, its holdings are a list of seeming non sequiturs. Some of the surprises in the roster are a motel, a factory in South Korea for turning rice straw into building material, and—at the time of writing—an interest in a professional football team, the Cleveland Browns.

These far-flung endeavors have come into the Nationwide fold as its imaginative president, Murray D. Lincoln, stretched a shoestring ($10,000 in 1926) into an "all lines" insurance giant.

Lincoln's obsessions have been with business growth and economic democracy. Examples of the latter are his presidency of the Co-operative League of the U.S.A., the backing given CARE by Lincoln and Na-

HUGH FLAHERTY—Prod. Coord.

MARIE E. NEAL—Photo Lab Tech

RACHAEL EARNHEART
Ass't Artist

JAMES E. SHOCKLEY—Artist

BETTY J. SPAUR—Typist

JOHN J. HAUNTY—Artist

DAVID A. MILLER—Audio Tech.

E INSURANCE

tionwide (he's board chairman) and, closer to home, the fact that the company publication is permitted a running battle—in print—with the company cafeteria.

Lincoln combines his double enthusiasms with policyholder-management conferences. Theoretically, the policyholders own the firm in a mutual company, but few base much action on this theory. One mutually advantageous idea generated by Nationwide policyholders in these conferences is merit-rated automobile insurance. Safe drivers pay a lower premium, based on their accident record.

When Nils Lindquist switched from a newspaper job to work as staff photographer for this unusual business complex, his managing editor asked if he wouldn't miss the excitement of newspaper photography. At the time Lindquist was more concerned about being able to buy a house for his family than the excitement of wading through snowdrifts for a weather shot—but he found there's excitement outside of daily journalism.

Work for Nationwide has led him to assignments all over the United States, to Europe and to Central America. He's as likely to be boarding a trans-Atlantic plane, shooting a motion picture of building construction in New York (where Nationwide is interested in co-operative housing projects), or photographing a football coach, as he is to be taking a picture of the Christmas party for Nationwide kids at home in Columbus, Ohio.

Nils' two-men, two-women photo group is part of the Graphic Arts Service Department, a unit which supplies visual materials for Public Relations and for other groups in Nationwide. The boss is art director Don Cotner. All this comes under Calvin Kytle, Nationwide's vice president in charge of Public Relations.

The primary job is to furnish graphic arts work and advice for an external magazine, *Minutes*, an employee magazine, *World* and an employee newspaper, *The Dividend*—and supply audio-visual material, including films, tapes, slides and slidefilms.

Another regular task is photography for an agent's publication, *The Challenger*. The priority belongs to the PR assignments when deadlines loom, however.

Still other departments have occasional use for the help of Graphic Arts Service. Cotner's group shoehorns these in along with "government jobs." This latter classification is a tongue-in-cheek misnomer

for brochures and pictures done as a public service or for co-operative groups, many of which sponser Nationwide Insurance in the various states in which the firm operates.

Within the photography group, senior member Lindquist handles administration, motion picture and slidefilm photography and production. Gene Wells, also a former newspaper photographer, now handles the lion's share of the photo journalism. Marie Neal, who obtained her apprenticeship in photography while a member of the Air Force, does most of the printing, with an occasional assist from Wells and Lindquist when the going gets thick. She was spotted in a paperwork job by Nationwide's efficient personnel department, and hired by Lindquist when the department expanded. Betty Spaur takes care of letters, accounts and the fast-growing print and negative file.

The four produce about 10,000 photographs annually, plus motion pictures and slidefilms assignments. They expect this figure to rise steadily as the demand, and their efficiency, climbs.

Efficiency got a boost recently when the Graphic Arts Service Department deserted its overcrowded quarters in the main Nationwide building in downtown Columbus for a 4000 sq. ft. building of its own, in a residential neigborhood.

The building, a one-level affair, had been a commercial photography studio before Nationwide bought out the former owner lock, stock and process camera.

Lindquist had not counted on the process camera, but finds it a boon in producing line and continuous tone copies for artists' paste-up mechanicals.

Rather than encumber themselves with a design intended for another purpose Graphic Arts Service decided to remove all interior walls and begin at the beginning.

They gave Lindquist first crack, because much of the work space is devoted to photographic laboratory and studio.

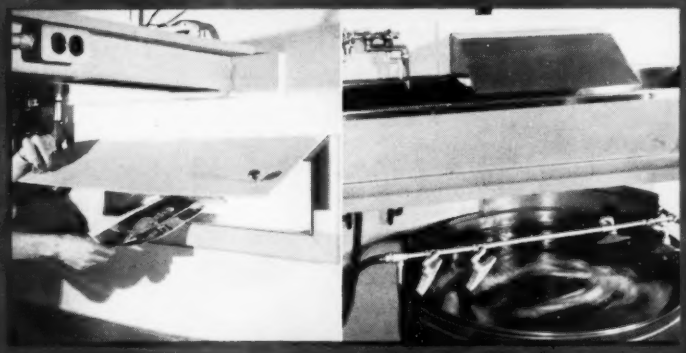
Nationwide's Property Management Department took over the actual construction, basing their plan on a Photostat of Graphic Arts' layout, which was plotted with scale cut-outs of fixtures.

Choice of the color scheme was reserved by the artists. They employed a functional matte black for darkroom light traps, but let their imagination roam in selecting colors

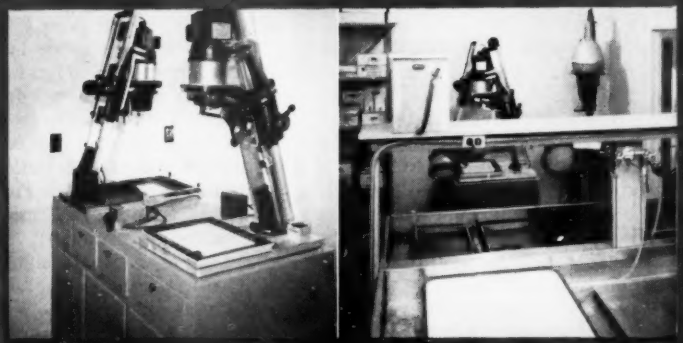
START FROM SCRATCH PAD

In planning their laboratory, Nationwide's photo staff had the unusual advantage of a clear, unobstructed rectangle in which to carry out their ideas. The company bought a photographer's building and removed all the partitions. The recently-completed result is shown in this blueprint. Photo studio has high ceiling; remainder, dropped acoustical ceiling of a product made by a Nationwide subsidiary, Tectum.

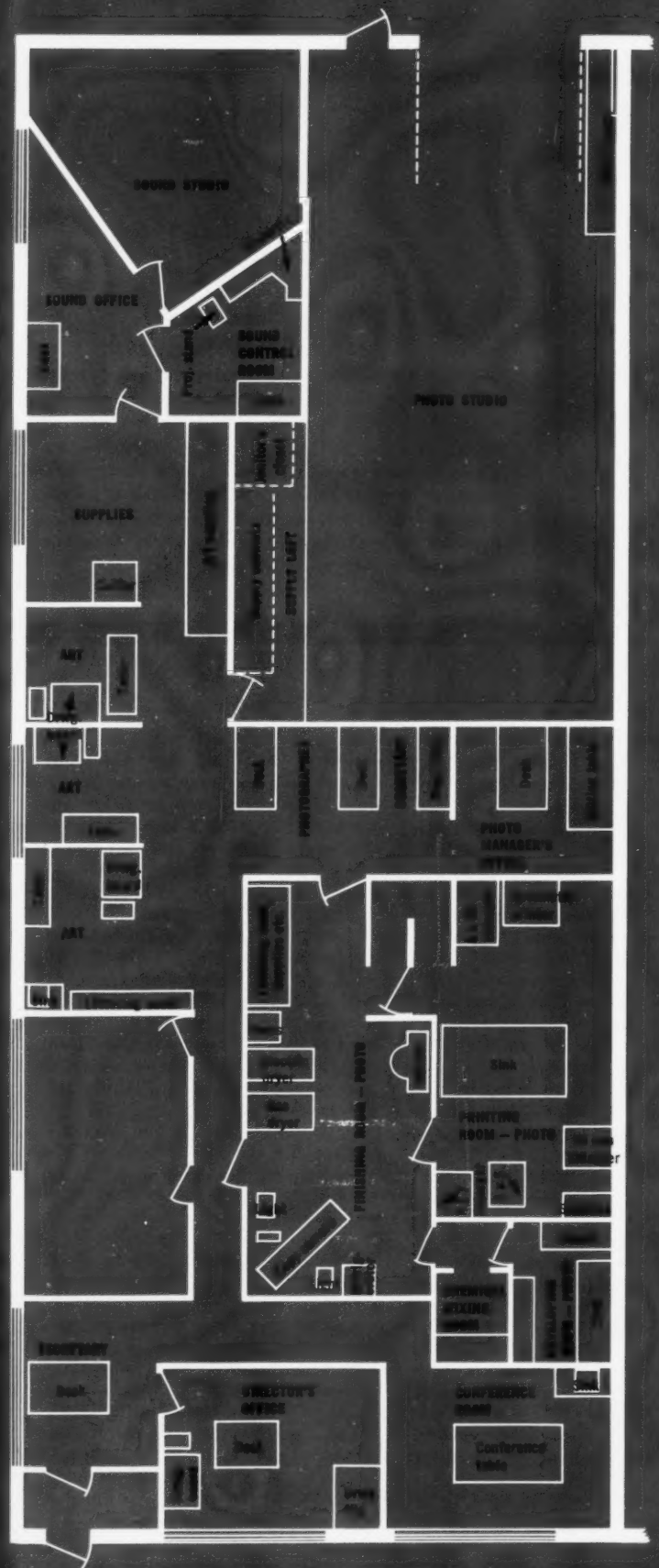
Sound studio, seen through glass in photograph, is odd-shaped room at upper left in the floor plan. Its unusual perimeter is intended to improve acoustics. Tape library is accumulation of film and filmstrip narration, records of speeches made at company.



Pass-through at end of sink is simple and fairly light tight. On other side of pass-through, prints drop into wash tray, then go into glossing agent. The washer's low location conserves space, and staff footsteps. All prints are treated with hypo clearing agent.



Island sink design doubles the access area vs a wall mounted sink, and permits two printers to process work simultaneously. Arrangement is carried a step further with enlarger bench. Paper drawers are double ended, can be reached from either side.



for walls and doors—using everything but boardinghouse buff.

Lindquist used a more or less standard darkroom layout, with a central sink that can be worked from two sides simultaneously. A pass-through at the end of this sink sends prints into the finishing room, also more or less standard. A slight deviation in the washing area—placing the washer below the receiving tray—compresses space, and is convenient as well. This and other refinements are shown in the illustrations. The intercom is a touch of glory made possible by staff co-operation. Lindquist purchased intercom kits (HealthKit) and gave one to each willing hand for assembly at home.

The odd-shaped sound room was not the result of expediency, but rather part of a plan for better acoustics. The odd angles are intended to eliminate reverberating "standing" sound waves. An assist of home-made sound deadening materials makes the acoustics adequate for recording narration.

The audio technician is David Miller, who doubles as a projectionist. He fences with a control panel that is a conglomeration of group effort, and looks forward to rescue when a People's Broadcasting Co. engineer finishes construction of a professional control panel. (PBC is another Nationwide Insurance holding.)

Only the hook-up is temporary, however; the equipment has been doing yeoman's service for some time now. At the core is an Ampex tape recorder; auxiliary equipment is equally professional.

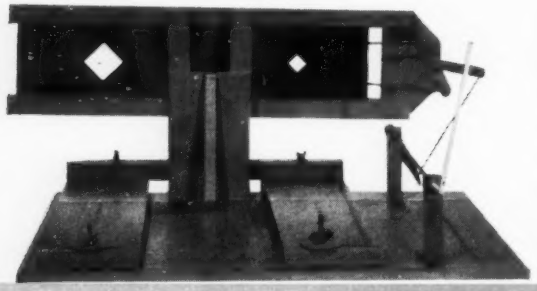
Its major use has been in recording sound-over-film narration and in preparing sound for filmstrips.

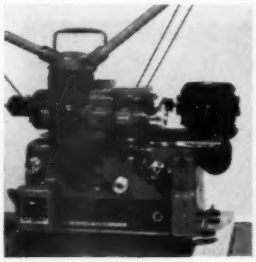
As mentioned previously, Lindquist handles the photography end for this work. Hugh Flaherty—whose official title is production co-ordinator—writes the scripts, keeps things moving and sometimes voices the narration. Much of the sound slidefilm work, and not a small portion of the motion pictures, are artwork. Thus Cotner, and artists Jim Shockley, Jack Haunty and Rachael Earnheart are involved as well.

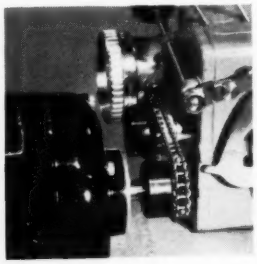
The slidefilms are used in recruiting salesmen, for sales promotion and for employee communications. An example of the latter is a slidefilm on employee benefits which is under way currently. (Lindquist shot the art on a Leica

TRICKS OF A-V TRADE

1 This unusual stand accommodates two 35mm slide projectors side by side. A shutter mechanism, operated with the lever at the right, simultaneously fades in one projector while fading out the other. The shutter consists of two sheets of black metal each with two diamond-shaped cutouts. The sheets overlap and the cutouts are offset to furnish the desired effect. The operating mechanism is levered like a locomotive drive.







2 For professional results when recording sound-over-film narration, a synchronous projector is a must. Proprietary synchronous projectors are not cheap. Lindquist took the hard, but inexpensive, way out by building his with plans lent by a photographer friend in another industry. He purchased a stripped down Bell & Howell, attached a synchronous Bodine motor to the projector with a drive chain. Idea came from another industrial staff man.

for projection; uses a Bell & Howell automatic projector to obtain management approval before committing it to a master filmstrip.) Flaherty's script is a very soft sell, humorous conversation between two native Buckeyes, and the illustrations are startling abstractions in prismatic colored paper cut-outs. They jolt you to attention while the voice calmly unravels the what's, why's and wherefore's of the extensive employee benefit program at Nationwide.

Lindquist uses a 35mm Arriflex of early vintage for slidefilm work, on a Florman & Babb Triplex animation stand. He was warned by Arri people that the camera was intended for motion pictures and not for start-and-stop filmstrip or animation work. But by paying attention to keeping lens and viewfinder capped and by shielding the camera wtih black paper, he is able to keep stray light out of its complex but convenient optical system.

The group is not so ambitious as to undertake all the motion pictures of the company, but it has enthusiastically, and effectively, executed limited release films.

One of these, *Mr. Smith Goes to Geneva,* is a report film on the Geneva, Switzerland, second annual conference on peaceful uses of atomic energy. Volumes of technical data have been released on this subject, but Nationwide's management was interested in having an idea of the progress in this area disseminated to the lay public. Lindquist shot the film pretty much newsreel style and Flaherty wrote and talked the script. It is straightforward, and factual; Flaherty saw no need to sensationalize the already fairly sensational subject matter, or Nationwide's sponsorship of this public service film. It has had good acceptance among groups of what Nationwide's PR department calls "thought leaders."

A film intended to bring in insurance policies by a more direct route is a recently completed presentation of Nationwide's 1961 advertising and promotion plans. It is being shown to company agents, who are independent contractors, and part of the job of the film is to encourage them to invest some of their money in local advertising. The company shares part of the cost of this and supplies made-up ads for this purpose. One of the big problems in this film was the time element. It is definitely dated material, but production could not start until the advertising agency had finished most of its creative labors for the forthcoming year.

The staff had only 30 days to do the job but they accomplished it on time, at a fairly low cost. Lindquist estimates the bill for the film (about half an hour screen time) was $5000 including lease of an Auricon, 600 with a zoom lens for sync sound portions, and 75 release prints—plus salaries and overhead. He did the animation on the Triplex with a 16mm Arriflex and an Acme registration board. Calvin handled the processing, sound mixing and printing. Lindquist shot the sync sound double system, using the Amplex and Rangertone synchronization. He handled the animation and photography of the ad samples, and collaborated with Flaherty on film editing.

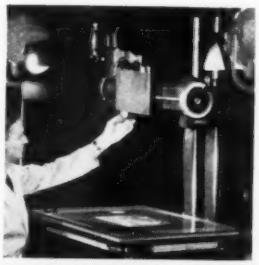
A 16mm Arriflex is the standard camera for all silent footage; it's adapted for animation with an animation motor and the light shielding set-up.

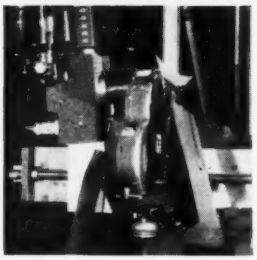
In the studio, Lindquist uses Bardwell McAllister 750's for most lighting situations, and shoots on Commercial Ektachrome or Plus-X positive. His lab advises positive for black-and-white because it eliminates one step when making a master print from the original footage. For location filming, Lindquist switches to Senior Color-Trans, and may use Tri-X film.

Back in the still department, Gene Wells has taken over must of

(*continued on page* 90)

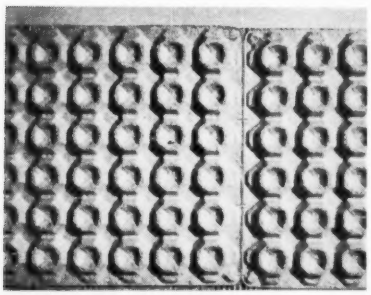
3 A Triplex Animation stand does a double service at Nationwide; mounted with a 16mm Arriflex with an animation motor, it's used for titles and animation. A 35mm Arriflex makes it possible for Lindquist to shoot masters for single-frame filmstrips. In either case, however, the camera must be carefully shielded from copying lights with black paper blinders *(right)*. For best results with any camera, the stand is surrounded by large folding screens painted with flat black to reduce light flare.



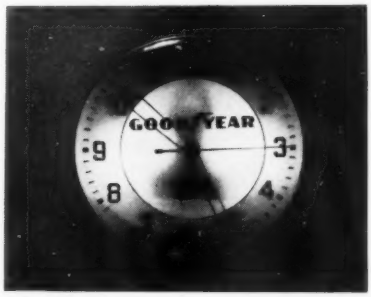


4 This editing bench was designed by Lindquist and built by Nationwide's carpenters. It puts all the editing tools—rewinds, viewer, synchronizer, cores and spools, splicer, writing pad and barrel—within easy reach. When the job is over, all but the rewinds and viewer go back into the drawers of the bench. The leaf for the writing pad and the splicer slides under the work surface. Besides looking neat, the system keeps tools away from dust and curious fingers.

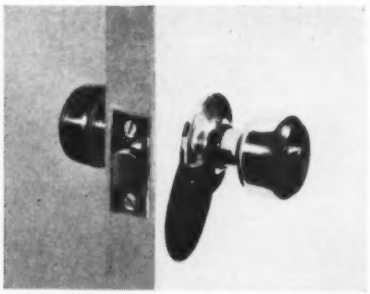
A LITTLE INGENUITY GOES A LONG WAY IN PHOTO LAB EFFICIENCY AND CONVENIENCE



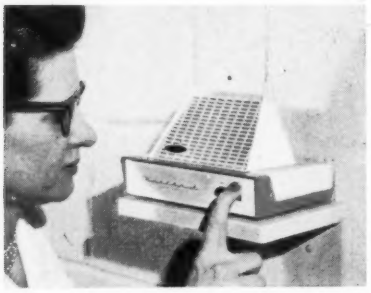
Muffler Papier mache egg carton separators stapled to a 4 x 8 plywood panel make a movable and inexpensive sound absorbing device.



Glowing report on time emanates from this advertising display clock, stationed in print lab, its white lights replaced with ruby safelight bulbs.



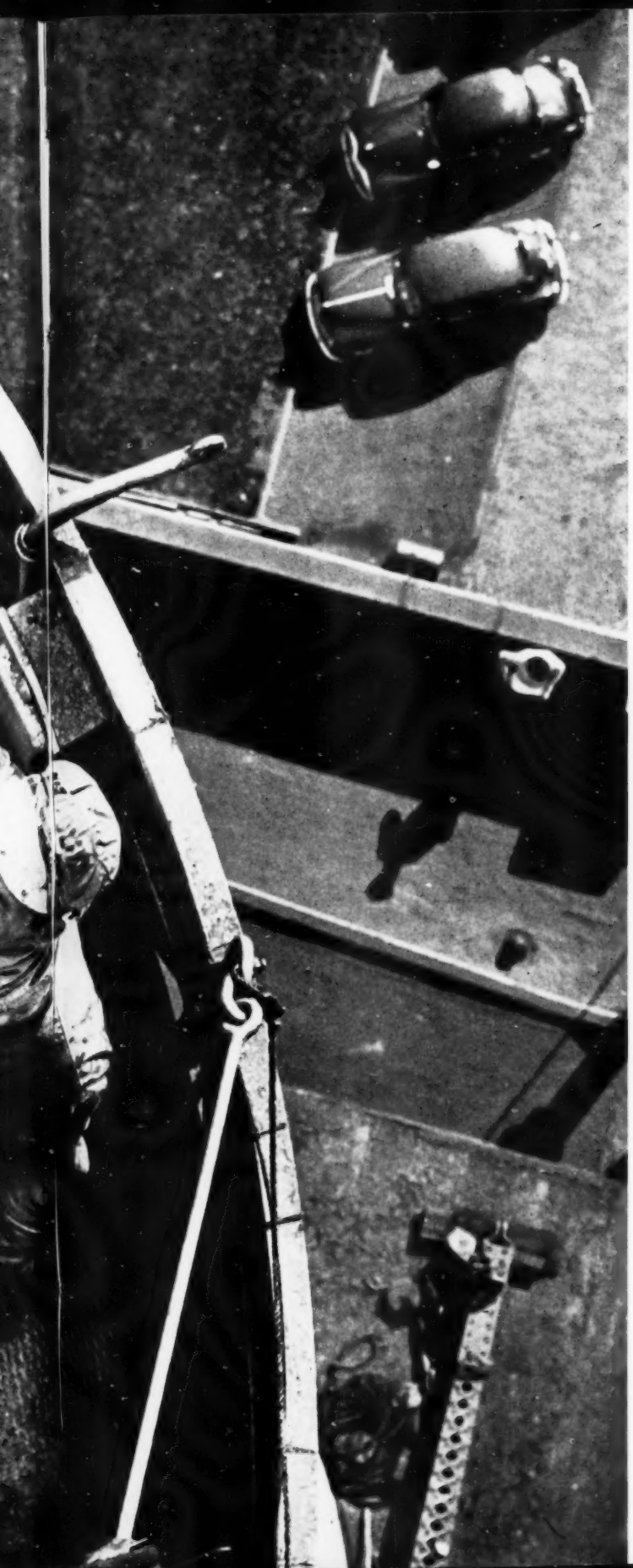
One-way door handle, designed for bathrooms, is Nationwide's extra emergency exit from darkroom. Always locked, opens only from inside.



Step saver for Nationwide crew is an intercom network. Lindquist bought HeathKits, gave them to members of the staff for assembly in their homes.

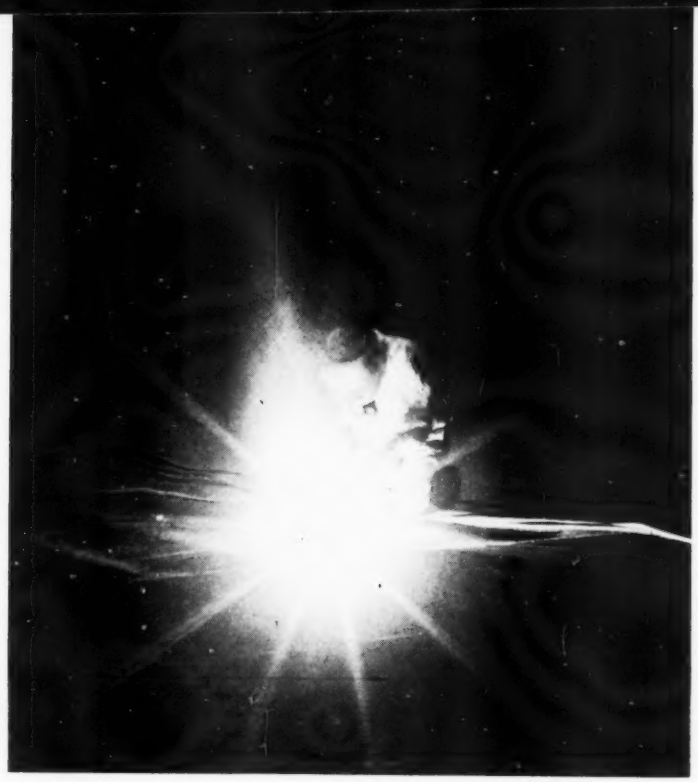
Find After long search for low-cost unit, Lindquist settled on case for hardware bins. It stores both 4 x 5s and 6-exposure 35mm negative strips.

Drying cabinet was inherited from previous owner of studio. Fan at upper right withdraws heated air from compartments. 35mm is simply air dried.



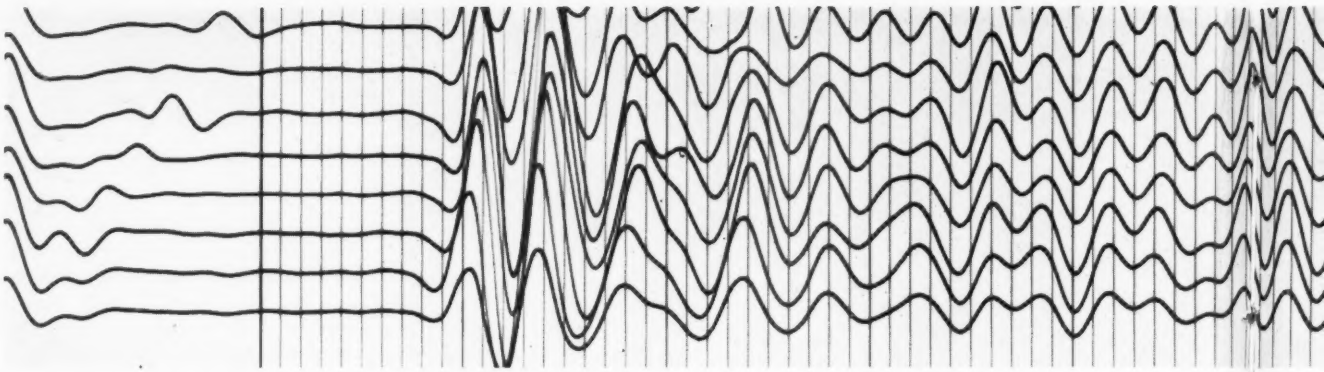
PORTFOLIO NO.29

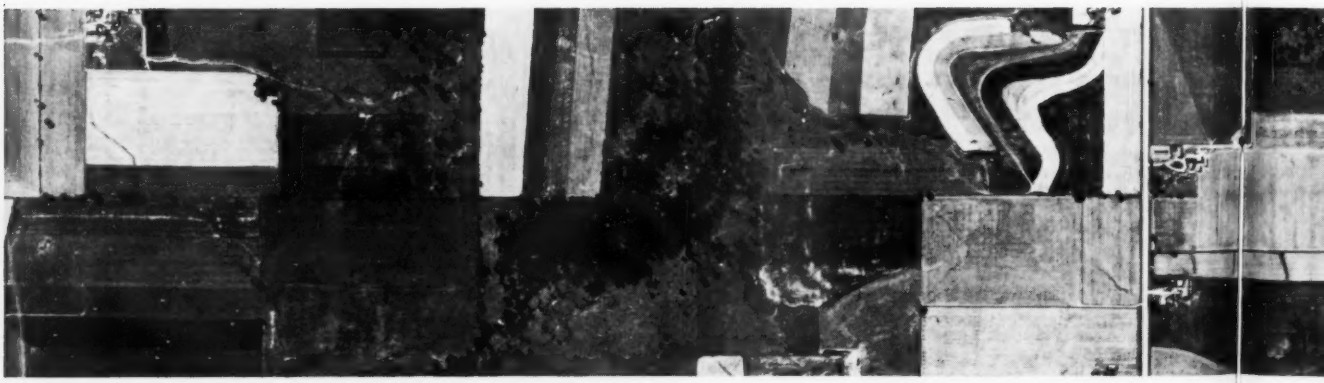
Ever since PMI started three years ago, the name of Joseph Farkas, Ford Motor Company, has been on some of the more interesting pictures to cross our desk. Somehow it seemed that Farkas never took the easy way out but generally tried to make each photograph a picture within the limits of company requirements. Here is a sample of Farkas



The painters on the preceding page are beautifying a smokestack 300 feet up at Ford's Rouge plant. To get this shot, a PR assignment, Farkas had to climb outside the safety ring of the ladder. He used a 4 x 5 Graphic and Super Panchro Press, Type B. A consoling thought was that the PR man was up there with Farkas. Despite the effort and risk, according to Farkas, the picture was "lost" in the local roto section. The picture at the *left* is published here for the first time. Showing a welder on the *Henry Ford*, an ore boat, it was made for the photographer's own amusement. Farkas was on assignment when he looked into a hold and saw the man. Made with a Graphic.

The two tractor pictures were made for display at the American Road show. They were taken at the Ford Tractor School, Vienna, Georgia, using a Rolleiflex. The film was Plus-X exposed at an index of 500 and developed in Promicrol. Farkas uses only one film, changing his index to fit the situation and using various developers to produce results. These pictures were enlarged to 20 x 24 for display use. Farkas, a former Navy photographer, has been with Ford for 14 years. Before the war, he was an amateur and part-time professional. While taking pictures for the Navy, he decided to become a full-time pro.





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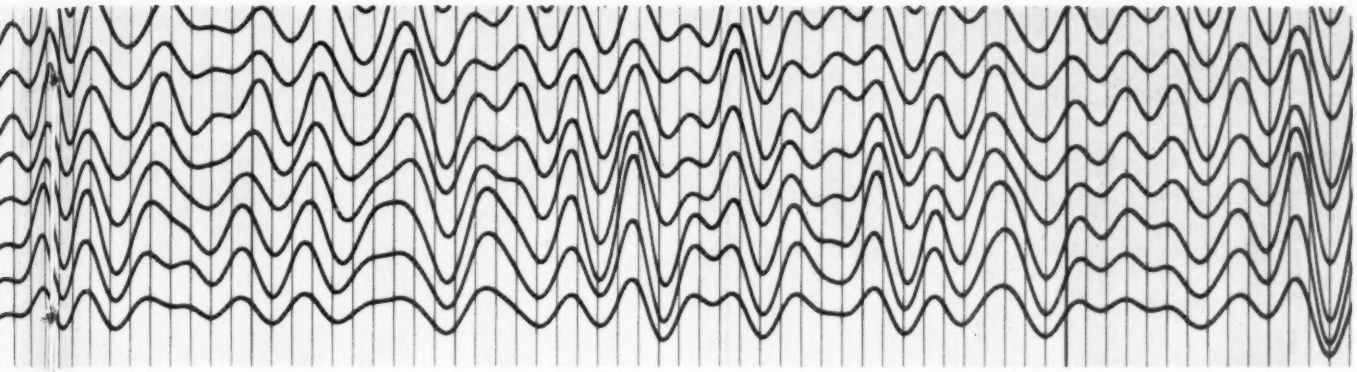

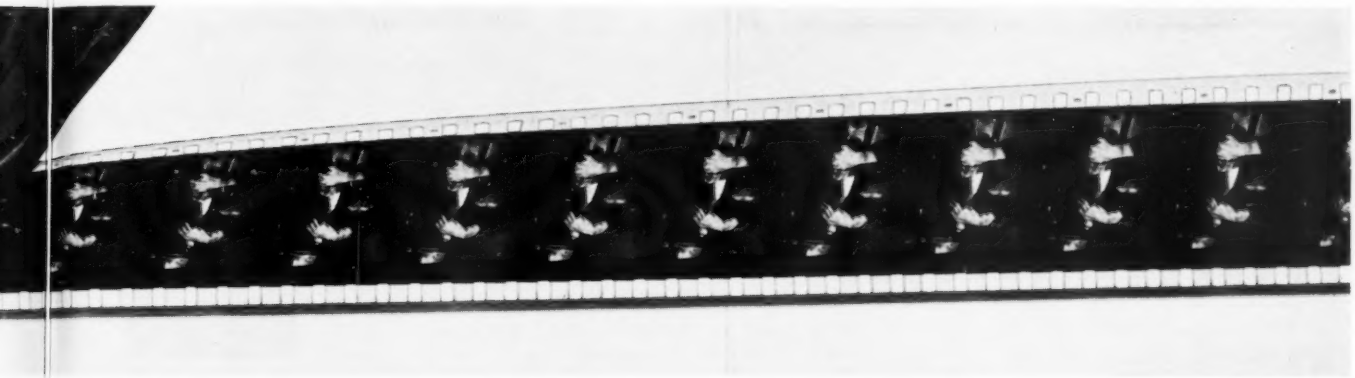

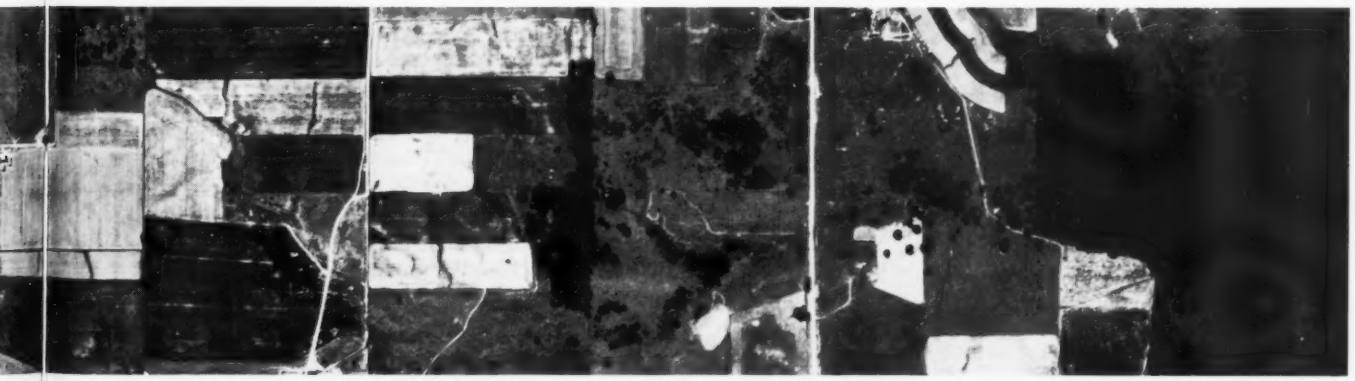

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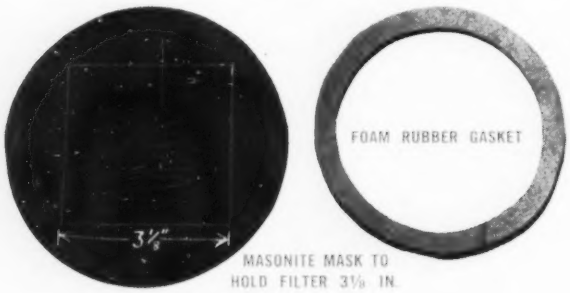
Photo-Writ® Photocopy Papers

UV IN A FLAS

Chances are, most of us give little thought to ultraviolet rays until we receive an overdose of them—usually in the form of a painful sunburn. Even then, few pause to consider the many very important functions of natural ultraviolet radiation. We are probably even less aware of the equally important role artificially generated ultraviolet light plays in our daily lives. This area of physics, which was once limited to laboratory experiments, has been expanded and refined until we now see "black light" being used in fields vitally affecting all of us—from exacting medical research through missile development and heavy industry.

Use of the term "black light" to designate ultraviolet—or near ultraviolet—radiation is a misnomer, for technically it is neither black nor is it light. True ultraviolet rays are not visible to the human eye, but they have the unique property of exciting certain materials which causes them to emit longer, visible rays. This phenomenon is fluorescence.

Techniques for photographing these interesting effects have been known for many years but the procedure has generally been a time-consuming, difficult and expensive task. In most cases, the pictures had to be taken in a completely darkened enclosure while time exposures up to 30 min. and longer were being made. The older methods also required the use of a tripod mounted camera, one or more quartz lamps or black lights with reflectors and stands, a power supply and other paraphernalia. Many times, pictures were impossible because the subject could not be moved to a location where the necessary light conditions could be arranged.



MASONITE MASK TO HOLD FILTER 3⅛ IN.

ULTRAVIOLET TRANSMITTING FILTER

LENS FILTER

The flash method outlined in this article eliminates most of these things. The camera can be hand-held, and the flash unit converted to an ultraviolet source with ease via an inexpensive filter. A completely darkened enclosure is no longer necessary and fast shutter speeds may be used. The professional worker may find this basic information helpful in improvising a more exact method to meet his specific needs.

Materials

A sheet of ultraviolet-transmitting filter glass must be obtained which is to be fitted over the bowl of the flash reflector. It should be large enough to cover at least the major portion of the opening. Any spaces around the edges must be blocked with opaque material. The purpose of this filter is to absorb the visible light emitted when the flash unit is fired, while transmitting only the ultraviolet—or near ultraviolet—rays to the subject. Ultraviolet filter glasses can be obtained from several sources and there is a great variation in both price and quality. A 3-in. square of regular run filter glass may be obtained for less than $5 while more exacting work may require an optically ground piece costing anywhere from $16 to over $50. In any event, a filter with a high ultraviolet transmittance factor which will filter out most or all visible light will probably be best for the purposes of the majority of photographers.

A lens filter is also necessary. For black-and-

ASH

Ordinary ultraviolet radiation sources are so cumbersome and dim that every shot is a federal case. Here's a method that makes use of present white light flash equipment—John R. Van Allen

white pictures a K-2 or X-1 will work nicely. For color a K-2 or 2-B filter will serve—depending on the effect desired. The lens filter allows the visible rays being emitted from the subject to register on the film while it filters out any ultraviolet rays not converted to visible light by fluorescence.

The only other consideration essential to this method is the use of a fast emulsion film which should generally be pushed in processing to its maximum practical speed.

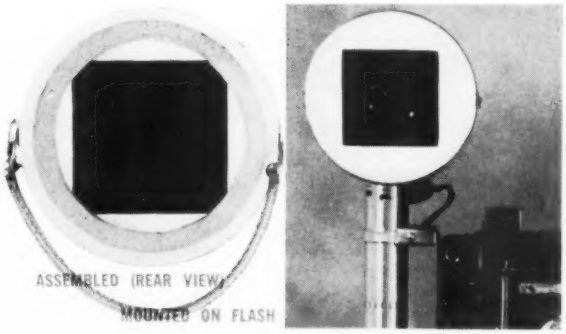
Taking ultraviolet pictures

In order to find the proper exposure combination, it must first be decided at what speed the film is to be processed. Once this is determined, a meter reading should be taken to determine the amount of existing light illuminating the subject.

The diaphram and shutter speed will necessarily have to be set fast enough to prevent existing, visible light from causing an image to register on the film since we want only the filtered light from the flash to create the primary image. In other words, the exposure will have to be something less than that called for by the meter. It will be necessary in many instances—especially outdoors—to shade the subject as much as possible.

A good basic exposure for color film (Super Anscochrome D) is 1/100 sec. at f/3.5 with a flash-to-subject distance of 2 ft. using No. 5 or 25 bulbs. With higher speed black-and-white films, smaller lens openings and faster shutter speeds may be tried or the flash-to-subject distance extended. Experimentation will determine the best lens combination for particular needs.

In many types of work, it is desirable to take control pictures which record the appearance of the subject under ordinary light. This can be done on the same roll of film if precautions are taken to avoid overexposure which might result from developing the film at higher speeds. Control pictures exposed by existing light only, with bounce flash or with the use of neutral density filters, are a few of the ways in which this can be accomplished with roll film color.



Some hints

Since the purpose of this method is to photograph fluorescence, anything that can be done to visibly separate the fluorescing material from its surroundings will improve the pictures.

For example, it is almost always advisable to shield the subject from visible light. Also, shorter flash-to-subject distance will allow faster shutter speeds and prevent existing light from destroying the subject's fluorescent contrast.

An ultraviolet filter large enough to cover the entire opening of the flash reflector would allow the passage of a proportionately greater amount of ultraviolet light from the flash source and increase the working range of the unit.

Finally, the use of an electronic flash unit—a much more efficient source of ultraviolet than

standard flashbulbs—would give the photographer more latitude and result in better pictures.

The flash method of taking ultraviolet photographs can be utilized in most situations where the older method of time exposures in a totally darkened area was used. It may also be of value at times when it is difficult or impossible to completely shield the subject from existing light.

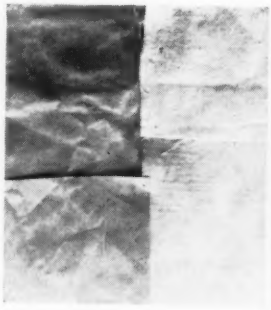
Applications

In law enforcement work ultraviolet light is used to detect and photograph evidence. A major advantage of its use is that it does not alter or destroy the exhibit as chemical assay methods would. Many body fluids have peculiar fluorescent characteristics. Forged or altered documents can be detected and photographed for convenient presentation in court. Fingerprints found at the scene of a crime may be dusted with fluorescent powder and photographed in place. Anthracene powder can be dusted on money or other objects to trap persons whose contact with the article can be proved and photographed on the spot with a source of ultraviolet radiation.

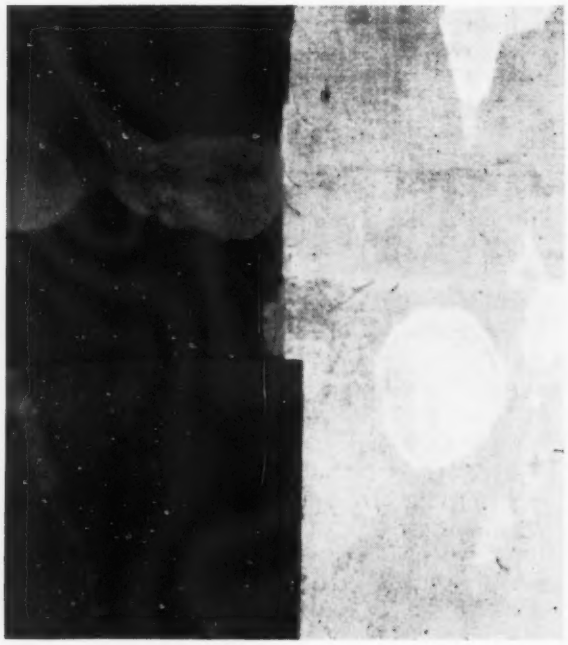
Both long and short wave ultraviolet light are useful in minerological work. Under ordinary light it is sometimes quite difficult to distinguish an ore or mineral from the matrix in which it is found. Ultraviolet photographs of an exposed ore body—in conjunction with control photographs—might give a fair qualitative as well as quantitative determination of its potential value.

In museum work, the flash method of ultraviolet photography has many uses. Weathered pictographs on the walls of caves or tombs, palimpsests and faded manuscripts can be photographed in the field. The resulting pictures would allow prolonged study of the characters brought

In public health work, UV can be used to detect adulterants, spoilage, contamination. Example: these stains of rat urine through flour bags *(below)* which fail to show in visible light photo *(right)*. These are black-and-white but color data is: Flash dist., 30 in. Meter, 1.6 Weston. Super Anscochrome (D) dev. to 200. UV filter over flash. 2B lens filter. 1/50 at f/3.5.



Under ordinary light conventional fingerprint powders do not show up well in areas where the background color is similar to the powder; neither black powder nor white powder would produce a full print with the variegated background *(left)*. When the print was dusted with fluorescent powder, however, and photographed with UV the entire print was visible.



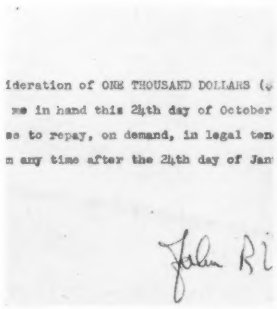
out in this way. Fossil forms sometimes show details of their original structure under ultraviolet light which are not visible otherwise. Art museums have long used ultraviolet light to detect reworked paintings, tapestries and ceramics.

Ultraviolet photographs or transparencies are useful for instructional purposes in many types of research and analytical work since conditions can be recorded which are not easily duplicated. Many other applications may be found in the fields of medicine, botany, zoology, bacteriology, chromatography and related subjects. Although it was not possible to thoroughly explore all of the areas in which a flash system of utlraviolet photography might be found useful, the work which was done leaves little doubt that practical application could be found in many fields.

The extreme sensitivity of modern photographic materials coupled with imaginative darkroom techniques can reveal details in ultraviolet pictures not observable to the unaided human eye. The professional photographer may be concerned with nothing more than creating interesting photographic effects through the use of fluorescent paints, chalks and other illustrator's media, while the scientist or laboratory worker may be able to refine the method and adapt it to his work. The constantly improving line of materials and equipment available opens previously unexplored areas to those with imagination and a yen for experimentation. The end product will be limited only by the ingenuity of the photographer.—THE END

The following is a partial list of sources for ultraviolet filter glass: Optical Sales Department, Corning Glass Works, Corning, N. Y. Kokomo Opalescent Glass Co., Inc., P. O. Box 359, Kokomo, Ind. Norco Mfg. Co., 392 Bleecker St., New York 14. Strobolite Co., 75 W. 45th St., New York 36. Switzer Bros., 4732 St. Clair Ave., Cleveland.

Many cleverly forged or altered documents cannot stand a test of examination under UV. This promissory note was photographed under ordinary light *(right)* and with UV flash *(below)*. Van Allen used a UV filter over flash; K-2 over lens. Flash-to-subject distance 2 ft. Meter reading 3.2 Weston; f/4.7 at 1/100 sec.; Kodak Royal Pan film developed in Ethol UFG 8 min.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me in hand this 24th day of October
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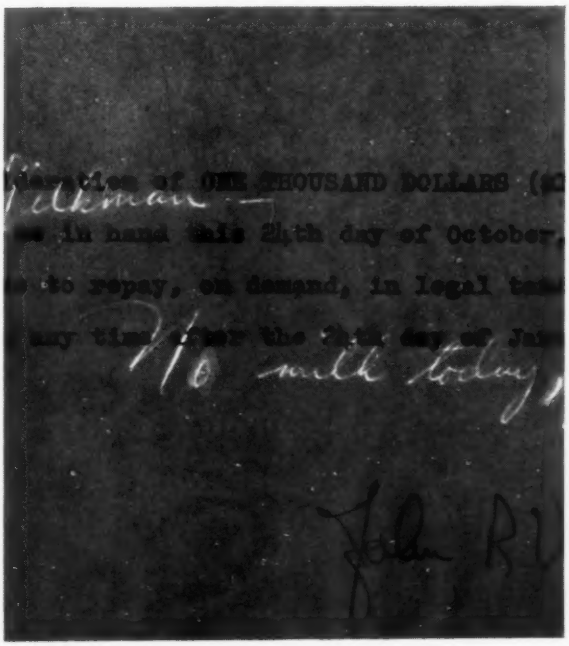
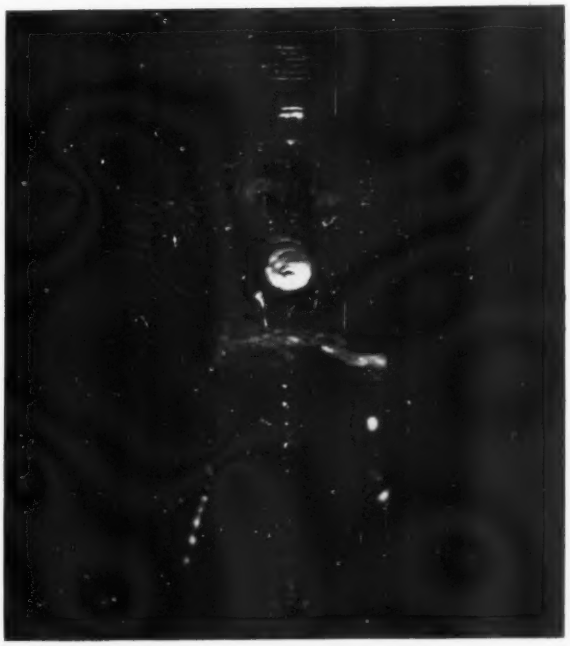
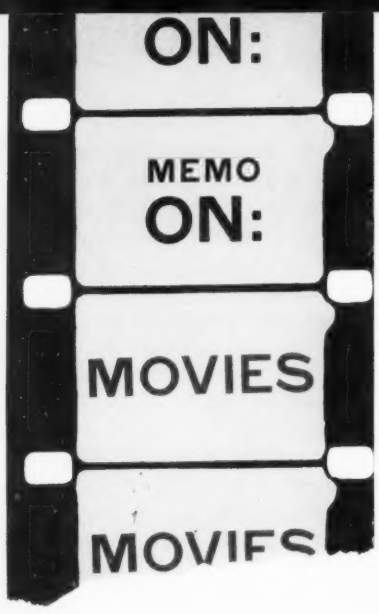
n any time after the 24th day of Jan

Two different materials which happen to have the same visible light reflectivity are likely to have different fluorescing characteristics. This principle is sometimes exploited in museum work, as exemplified by this pair of pictures. UV flash *(below)* shows a repair not noticeable with light *(left)*. Royal Pan. Meter 3.2. Exposure at 15 in.: f/4.7 at 1/25 sec. UV + K-2.







How do you manage a motion picture department? Few try without money, men, backing

One of our favorite tycoon stories involves the elder J. P. Morgan. A tactless type who had just come into a few million was asking Morgan, somewhat pretentiously, how much it cost to keep a yacht. Morgan, whose *Corsair* was famous, replied that if anyone had to ask how much it cost to run a yacht, then he really could not afford one.

This is by way of an answer to the question of what it takes to run an in-plant picture section. While it may never reach the astronomical sums and awesome complications of owning a seagoing yacht, there is often much more involved in a motion picture department than in a comparable still section. How much more depends, often, upon the function of the motion pictures themselves.

PMI's quick survey of in-company motion picture departments reveals a wide diversity of sections, both in size and capability. At the simplest it is a part-time task for a still photographer to handle unpretentious recording jobs or turn out the corporate equivalent of home movies.

At the other extreme are the huge sections of the largest companies who can turn out productions which rival Hollywood in quality and interest without perspiration.

Some place along the line—and it seems to be a different place for every company—a transition is made from the *un*specialized all-around crew to make the simplest kind of films to the highly-specialized personnel required for full-scale production. And during this transition, a new alignment of responsibility must be openly or tacitly arrived at.

In still photography—or in objective recording with motion picture photography—the photographer is the decision maker. Someone else may decide that the picture need be taken and an art director may draw a picture of the picture he wants, but finally it is the photographer who decides the composition and the treatment—and who finally gets the credit or the blame.

Motion pictures, on the other hand, are a group effort; the final success or failure, if it can be attributed to any single person, will not be laid at the photographer's door. The photographer *is* responsible, but only for the technical aspects over which he has direct control: framing, lighting, focus, etc. Although he may be called upon to furnish ideas, the overriding idea is the responsibility of the script writer. The director is responsible for bringing the idea to life; and that most important aspect of the motion picture—time—is finally the job of a film editor under the guidance of the director. Sound and music are almost entirely the job of a sound man or sound crew.

Certainly there are exceptions to the above. Some of the finest films of both theatrical and non-theatrical nature have been pretty much one-man jobs. But these are exceptions. Generally, one man can't do it all and somebody's got to be boss. Basically, the top job on a movie is the director's.

Some in-plant sections with unusually capable photographic management have risen to the task of full motion picture capability by hiring or renting people with long training and experience in the necessary skills—scripting, drama, sound, editing, production.

Members of other groups have promoted themselves out of photography jobs by learning those other necessary skills.

Two-in-one

In a third type of basic organization, perhaps the most workable in an in-company situation, there are actually two organizations. One more or less creative and the other more or less technical. The strictly photographic group takes the technical end of the service stick.

Photo acquires the appropriate equipment and trains or hires the appropriate staff to operate the cameras, lights and (often) the sound equipment. This group also handles the flow of exposed and processed film to and from the motion picture laboratory. (Unless there is a considerable volume, a security problem or necessity for seeing results in a hurry—outside processors are often more economical.) The unit handles editing in close cooperation with another department which is responsible for the content of the film.

This other department may be public relations, industrial relations or a special communications group of some kind or another. Usually, it is a management function.

Basic equipment

These questions aside, there is always the problem of suitable minimum equipment. There is general agreement as to what a basic outfit would be. This involves a fairly good camera of the Bell & Howell-Bolex-Cine Special class with a set of lenses, wide-angle, normal and telephoto. For field work by non-photo people, some sections provide Brownies or similar easy-to-use models. For the professional, however, this type of camera is considered minimum equipment. They are not cheap, running anywhere from $500 to $2000 with lenses. A good movie tripod and pan head is a second requirement. In practice, this becomes part of the camera. No professional would use a hand-held camera except in emergency work. Typical of the tripods used are Ceco and Akeley. These are heavy tripods usable not only with these cameras but with the heavier models, like the Mitchell, as well. These items will cost from $100 to $500 depending upon the make and model. They are, however, an investment in good, steady filming.

An exposure meter is the final item on the basic list and any of the better meters will do. For more exact lighting control, however, there is the Spectra, a $99 incident light meter, or the various spot meters such as the Elwood, costing well over $100.

The basic kit above was listed as basic equipment at the 1960 Industrial Film Producers Association convention in Los Angeles. The list does not include minor acces-

(*continued on page* 90)

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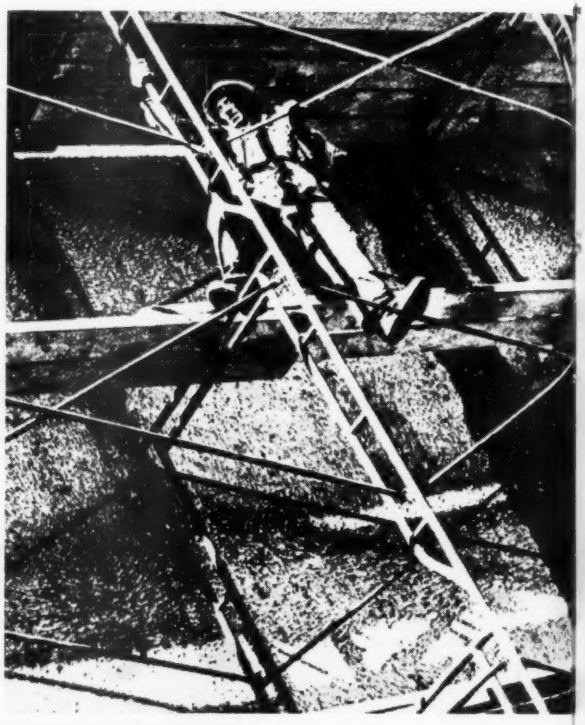
PMI's Monthly READERS' SHOWCASE

This marks the reappearance of a feature missing for several months from the pages of PMI. Readers' Showcase was squeezed out under the pressure of space limitations—and for the lack of a backlog of good pictures that demanded to be published.

In other words, friends, our inventory is low. So if you have a favorite industrial picture that you have been admiring on the darkroom wall, take it down and send it in. Right now, frankly, is your best time to win $10 and national or even international recognition for your work (these magazines get around).

Let us give some hints about what goes in our smoke-filled judging rooms: First off, we have a strong prejudice toward the in-company man—because we're an in-company magazine. Second, we feel no spite for offbeat subject matter. If you make a print of a printed circuit negative that just happens to have a nice design to it, we're likely to use it. Third, we like action in pictures. One of the easiest ways to get this is to leave people in the pictures. And we like to see people in the pictures. But obvious posing kills it for us. Fourth, if the picture proves something, just what it proves may influence our judgment. Tell us. Lastly, we're pushovers for high-speed, low-speed, pictures through the microscope, pictures of working boats. No dogs or kids. Send a return envelope appropriately stamped. Address: Showcase, PMI, 33 West 60, New York 23, N.Y.



RICHARD ALTHOFF is a Flushing, N. Y., freelance wh does more than his share of construction photographs. Thi time he tried something different: he projected his Tri-X Rolle negative on process film, and printed it back to positive paper.

S. W. ACKERMAN is another freelance. Home base i Long Port, N.J. He made this intriguing design with GE breake er springs in a conference room, with yellow art paper for background. Lighting: One No. 5 flash overhead

AL KRESCANKO, S. C. Johnson & Sons, Racine, Wis., made a series of photographs of the elaborate steamfitting in his plant as a creative exercise. This is one of them. It displays his sense of design.

CHARLES WEBBER, Sperry Gyroscope, Flight Research, Ronkonkoma, N.Y., calls this shot an "out and out hoax." He double printed two 4 x 5 Crown Graphic negatives to make a meaningful montage out of two shots which would say nothing alone. Tri-X. Plane, 1/500 at f/11; tower, 1/100 at f/32.

WILLIAM FRAZIER, freelance from Newark, N.J., likes the "just the facts, ma'm," documentary approach. Here he dramatizes the strength and effort of a cupola tender in a simple photograph. Frazier used a Mamiya Executive 35mm, with Panatomic-X developed in UFG. Exposure was 1/100 sec. at f/4.

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Arnold Eagle

INDUSTRIAL MOTION PICTURES

Film montage: a definition and applications of this cine tool

The one thing that "film montage" does *not* imply is the superimposition of one image on another, as in still photography. Rather, it has to do with the effects created by arranging the order of filmed sequences. There are a number of variations on this idea, variations in intent and technique. Some of them are well enough established to have names of their own: Eisenstein's intellectual montage; Pudovkin's constructive editing, rhythm montage; visual montage; dynamic montage, etc.

Let us reduce the expression "film montage" to its common denominator: it means splicing together various shots which ordinarily have no direct visual continuity. The purpose is to create a specific impression or meaning for the viewer. When I say "visual continuity," I am using the term in its strictest sense: where the movement, position and other characteristics of one shot are continued exactly in the ensuing shot.

Montage and newsreel

Montage technique differs from newsreel technique. While both are put together from various shots without continuity, in newsreel, each shot is an entity in itself; one shot has no relationship to the others, unless there are two or more of the same subject. And there is no attempt—other than in the narration or title—to create a relationship between shots. Montage technique is based on the theory that two unrelated shots, when put together, can create a new meaning possessed by neither alone. This theory of synthesis of images was developed by the Russian film makers in the late twenties. Men like Eisenstein, Pudovkin, Timoshenko, Kuleshov found it especially adaptable for their propaganda films.

Although the montage technique as developed by the Russians is not used much in our current sound films, it had a tremendous impact on the development of all film making. But Hollywood uses montage today only in a very limited form, usually as a transition. It can be especially effective, however, in a non-fiction film which is shot silently, with narration added.

Inspired by Griffith

The Russian directors, such as Eisenstein and Pudovkin were inspired by the American film genius Griffith and his two epic films, *The Birth of a Nation* and *Intolerance*. They studied his technique of intercutting and crosscutting. (In *Intolerance*, Griffith follows four different stories at the same time.) They were especially impressed by his use of the close-up, and his fragmentation, or breaking up of a scene for dramatic effect. They declared that the paramount art of the film is not in directing the actors; not in special camera techniques; but in the editing. They asserted that only through juxtaposition can one achieve real dramatic meaning.

I think it is worthwhile to repeat here the classic experiment conducted by Pudovkin and Kuleshov. They took a close-up of the actor Mosjukhin wearing a neutral expression. They joined this close up separately to three different shots: a plate of soup on a table, an open coffin containing the body of a dead woman, and a little girl, playing with some toys. Then the three combinations were projected before an audience which was not let in on the trick. The spectator reaction was unbelievable. All raved about the mobile face of the actor and his great ability to act. They admired his pensive mood as he gazed at the soup; they were moved by the deep sorrow shown in his expression as he mourned for the dead woman; and they rejoiced with him as he smiled happily at the playing child. Not one person in the audience was aware of the fact that the

(*continued on page* 64)

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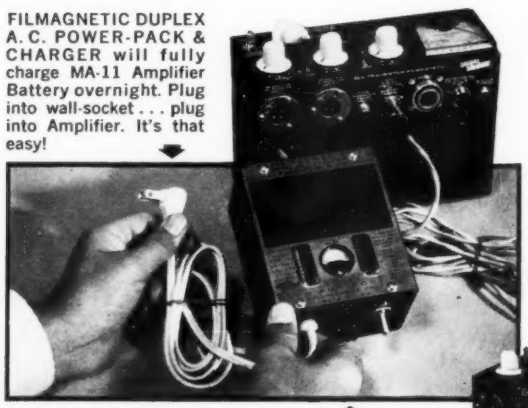

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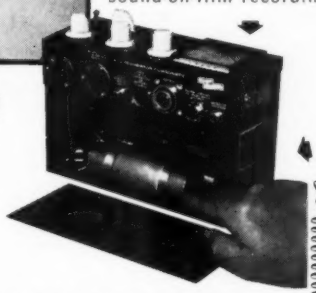

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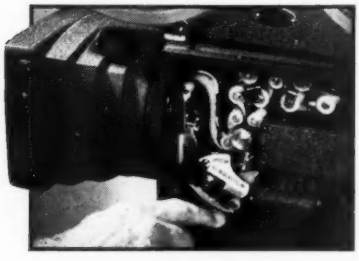

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(*continued from page* 62)

same neutral expression was displayed in all three sequences.

The Russians used juxtaposition and the psychological principle of association throughout their films. When Eisenstein portrays the shooting down of a mass of workers in in a strike scene, he cuts directly to the slaughter of an ox in a stockyard. In his most famous film, *The Battleship Potemkin*, he cuts from the magotty meat—the direct cause of the mutiny—to a close up of the motto on a plate, "Give us this day our daily bread." This contrast of ideas, the shock effect of opposites, plays an important part in what has come to be known as the intellectual montage. In Pudovkin's *The End of St. Petersburg*, he contrasts the fighting and dying soldiers in the muddy trenches with a cross cut of city-dwelling financiers frenziedly rushing to the stock exchange to cash in on the rising market.

Feelings through imagery

Image associations were used to interpret and strengthen certain other statements. An example is found in the prison sequence of Pudovkin's *Mother*. Pudovkin tried to express the joy of a prisoner who had just been informed that he was free. The director felt that just the close-up of a smile or of joyful eyes was not enough. So he cut in a scene of a rushing brook in the springtime; he showed the play of broken sunlight on the water; one saw birds splashing in a village pond; and the final shot was that of a laughing child.

It is impossible to describe in a short article all the aspects of the various Russian montage techniques. They utilized rhythm in the length of cuts, repetition of theme, contrast of ideas, association of ideas; and were great employers of the close-up.

One of the main weaknesses of this type of montage is that it can easily become obscure and confusing. Its complete ignoring of time and space orientation may be very disturbing to the viewer, he may not connect the splashing of birds in a pond with the joy of freedom. A shot of Kerensky in the Winter Palace, in Eisenstein's *October* film, followed by a shot of a statue of Napoleon, may not suggest to everyone the betrayal of the Revolution. But the Russian-developed techniques don't necessarily lead to obscurantism, and some are valuable in any film editing. Good examples are the accumulative effectiveness of repetition—or the heightening or lessening of emotional tension, controlled by the length of each cut.

Montage cliches

The term "montage," as used in British and American films, means a quick impressionistic sequence of disconnected images spliced together and used as a transition to convey the passage of time, a change of place, or a number of occurrences in different places at the same time. These shots are just spliced together, or linked together with quick dissolves or wipes. Many of these montage sequences used in Hollywood have become cliches. Time is depicted by tearing off calendar leaves, or by showing the same landscape changing from spring to summer to fall to winter. Travel is shown by railroad train wheels rushing on a track. The montage technique is also used in economizing; in trying to give an overall impression of a place or happening.

For instance, to portray a period of economic depression in this country, we may see this series of shots: crowds being turned away from factory gates; standing in front of employment agencies; breadlines; apple selling; someone searching in a garbage can.

I think that the most effective montage technique is visual montage, especially useful in documentary and non-fiction films with narration. I have in mind the repetition of subject movement and camera movement from one shot to the next; also the repetition of shapes, activities, and color. I am remembering camera movement like that in the documentary, *The City*, when the camera tilts down on a skyscraper, and dissolves with the same movement into another tilt of another skyscraper, and then into another, until you have the feeling that the buildings in the city are a thousand stories high.

Where to see them

If you want to see some excellent examples of visual montage in industrial films, look at some of the work of Lewis Jacobs and Victor Solow, shot for M.P.O. for Chemstrand Co., Ford Motor Co., General Motors, etc. Or see what *On Film* did for Alcoa Aluminum. Perhaps the finest illustration of the use of montage in industry is Burt Hanstrom's film made in Holland called *Glass*. It is one of the finest industrial films ever made.—END

Lawrence Baldwin, General Office Supervisor, watching operator of Ektalith Loader-Processor turn out offset master. Companion Ektalith Copy Unit is at right.

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Camera is 2¾ in. in diameter, 31½ in. long. Conical mirror is 5 in. from end.

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bore

At one time the only sure way of telling what lay beneath the topsoil was to dig down and find out. The picture below shows the results of just such an effort. It is the core of a calyx drill hole, a 28 to 36-in. cylinder chewed out of solid rock to enable a geologist to climb into the earth to study a site for a hydroelectric concrete dam. That hole costs the United States as much as $200 per linear foot. Today, however, a camera—the Army Corps of Engineers "NX" Bore Hole Camera—does the same investigating job and records the data permanently on 8mm color film. The pilot model of this new photographic probe cost $80,000, but it earns its keep by reducing the cost of subsurface investigation from $200 to 50¢ per ft.—Jay J. Kalez

Tourists and casual visitors to the dams that harness the water and power potential of our major rivers, seldom give thought to the study and scientific research necessary to that project before even the project site could be determined. Most certainly they never give thought to the part "amateur" 8mm color film, now plays in the determination of such dam sites.

No consulting engineer would ever risk approving a dam site location without first arriving at an accurate determination of the orientation of the faults, fractures, contacts, bedding plane and other geological features of the bedrock upon which the proposed dam was to rest. Formulating such a geological picture to a depth of 100 to 200 ft. over a foundation area is no mean order.

The most difficult problems involved in the construction of concrete dams are those resulting from bedrock imperfections that tend to escape disclosure by conventional subsurface exploration means. Until a few years ago, the only subsurface exploratory tool available to the geologists and engineers for dam site study was the small diameter diamond core drill with which cores of the site's foundation bedrock could be recovered for testing. Various types of bedrock flaws, however, such as ruptures resulting from enormous stresses to to which the rock has been subjected, planes or zones of weakness related to chemical alterations and underground erosion, frequently camouflage themselves in

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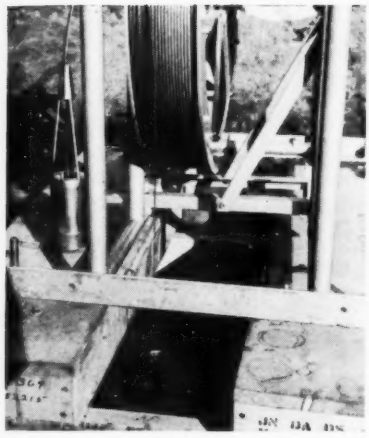
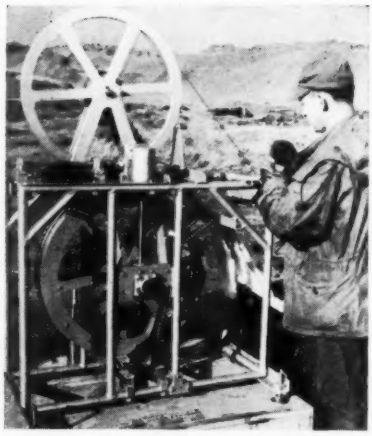


A dummy camera is payed down the bore hole first to test clearance.



Top cable controls camera; lower one holds it, has ton of tensile strength.

16mm microfilm viewer brings 8mm frames up to original size of hole.

core borings. Contractors and engineers alike know all to well that these subsurface imperfections can be of sufficient magnitude to necessitate costly design changes. This is especially true when their existence is not discovered until after the project's foundation excavation has been undertaken.

Old methods

To avoid all of these recognized geological engineering hazards, exploratory small diameter core drilling is usually supplemented by more reliable, but far more costly, exploratory methods such as test pits, shafts, tunnels and large diameter calyx drill holes. An investigating geologist may be lowered into these to physically examine the foundation bedrock structure to the depth desired.

To meet the almost prohibitive but necessary cost of such extensive exploratory methods, the Engineering Research Associates, Division of Remington Rand, Inc., under the technical supervision and in accordance with plans and specifications furnished by the Geology Branch of the Department of the Army, Office of the Chief of Engineers, Corps of Engineers, Washington, D.C., developed the "NX" Bore Hole Camera.

Under the direction of Mr. E. B. Burwell, Jr., now retired, and Mr. R. H. Nesbitt, present Chief of the Corps of Engineers Geology Branch, Washington, D.C., the camera was perfected and adopted for field use by the preparation of an operation instruction manual.

While the original cost of the pilot model of the "NX" camera was in the vicinity of $80,000, its successful use at only two dam location operations justified the expenditure in quick order. The numerous man-sized bore holes or calyx drill holes which would have been necessary at these two sites, would have cost approximately $200 per lineal foot. The conventional 3-in. diamond drill core holes photographed by the "NX" Bore Hole Camera had an over-all cost of approximately 50¢ per ft.

To date only a few of these bore hole cameras have been assembled and put to use. One camera is located at the Corps of Engineers' Ohio River Division Laboratories in Cincinnati, Ohio, where considerable experimental work on the camera's lowering device and transportation equipment is being made. The second camera is located in the Corps of Engineers' Sacramento, Calif. District. The Sacramento camera, along with the loan of an expert geologist operator, Mr. Reed Anderson, was in recent use in the Walla Walla District of the Corps of Engineers for the location determination of the $418,000,000 John Day Lock and Dam on the Columbia River, now in its first construction stage.

Now in use

Since then, for use at Ice Harbor Lock and Dam on the Snake River and the "new start" on the Snake, Lower Monumental Lock and Dam, the Walla Walla District has acquired a complete "NX" Bore Hole Camera, lowering rig and projector of its own. The Republican Engineering Co., of St. Paul, built and assembled the District's "NX" outfit, with the cost of the complete camera, lowering rig and projector being in the neighborhood of $20,000. The camera has been used in making a photographic record in color of several thousand feet of 3-in. bore hole interiors, not only along the river shoreline at various Snake River Dam sites, but in inundated river bottom locations as well. The adaptability of the camera to these conditions has been successful.

Externally, the camera unit is a simple stainless steel tube 31½ in. long and 2¾ in. in diameter. A circular quartz window, not unlike a lighthouse window, located 5 in. above the lower end of the camera, acts as the lens. Internally, its principal parts include an oil-damped compass which supports a hollow and truncated conical mirror. The mirror is located inside and directly opposite the circular quartz window. The compass is located just above the center of the conical mirror for good visibility, and it appears in the center of each frame. Properly read, the compass is an excellent indicator of the direction of the bore. This is an important advantage of this type of analysis.

A high voltage circular flashtube midway between the cone mirror and the camera lens, actuated by a current impulse control by the camera lowering gear, simultane-

(*continued on page 79*)

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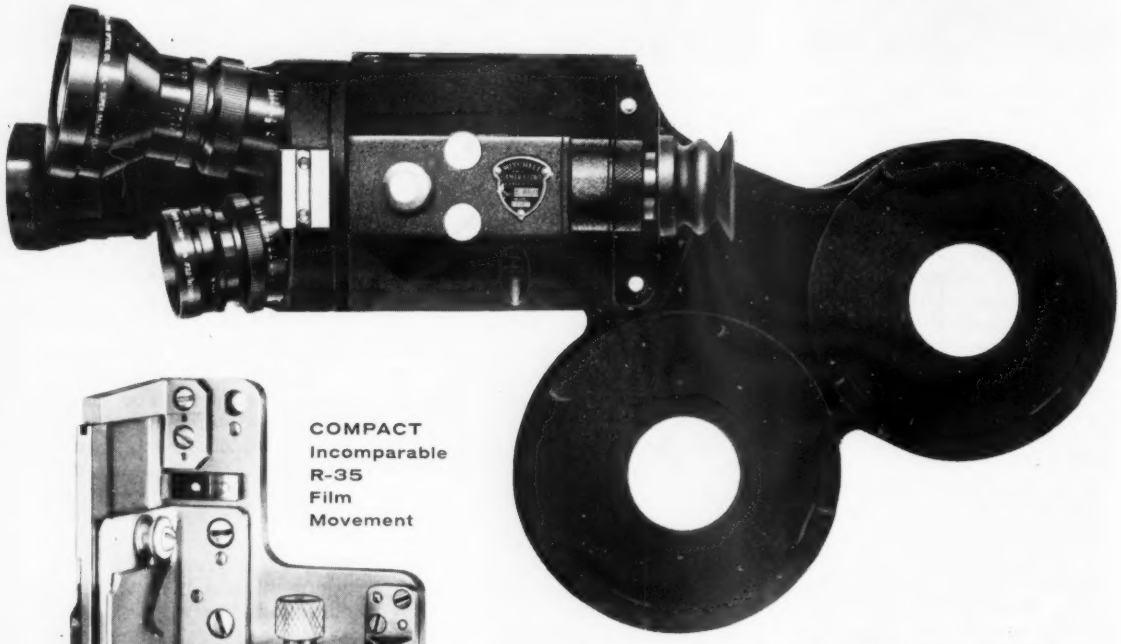

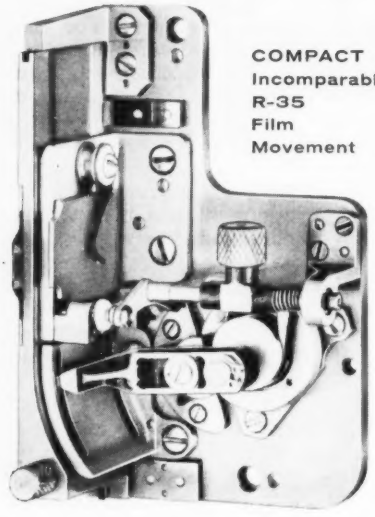

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Get more information. Circle 462, page 85

HYZER ON HIGH SPEED

High-speed photography usually requires lots of light. William G. Hyzer analyzes the tools and tricks

Incandescent lamps constitute the most frequently used artificial source of illumination for industrial applications of high-speed photography. In recent years, significant advances have been made in the more efficient utilization of light emitted by the incandescent filament-type lamp. The integral-reflector type of lamp, which comprises perhaps the most common and convenient source of light in high-speed photographic work, offers the advantages of being 1) compact, 2) efficient, 3) inexpensive, 4) readily available commercially and 5) versatile. Each of these factors is vital in selecting a light source to be used on the wide range of problems of varying complexity that are normally encountered in industrial work. Let's consider each of these attributes.

1) Compactness. A light source that is small in size and light in weight may be crowded in close to both the camera and subject under conditions where physical space is limited. Its light weight permits the source to be attached to machinery or other natural supports close to the area to be illuminated with alligator clamps or other clamping devices of similar construction. In addition, the compactness of these sources makes them convenient to carry in large quantity to assignments outside the plant area.

2) Efficiency. Needless to say, the practical efficiency of a photographic lamp is a most important consideration in its selection. The practical efficiency of a photographic lamp, measured in terms of the illumination produced at the plane of the subject for a given electrical power input to the lamp, may vary considerably from lamp to lamp depending upon the particular application at hand. The General Electric Co.'s PH/750R lamp, for example, is a highly efficient source of light at a lamp-to-subject distance of 14 to 18 in., when small subject areas are to be illuminated. High illumination efficiency is achieved at the expense of illumination uniformity. The reflector is designed to image the filament at the plane of the subject for a lamp-to-subject distance of about 16 in. Other lamps, the new Westinghouse DVP and DXA, are smaller in physical size and wattage, but approach the PH/750R in over-all luminous output to the subject area. These lamps are rated at 300 watts and are designed to operate 10 to 14 in. from the subject plane. Better uniformity of illumination may be achieved by using several of these lamps (usually four) in a bank, so that the images of their respective filaments overlap in a randomized manner in the plane of the subject. Further improvement in illumination uniformity, but at the expense of efficiency, is obtained by interposing a diffuser between the lamp and the subject. In the more common RSP2 bulb for example, the diffuser is an integral part of the lamp envelope. In ordinary high-speed photographic work however, illumination uniformity is often sacrificed to achieve the required high-level of illumination at the plane of the subject.

3) Expense. The relatively low cost of these lamps permits them to be considered expendable items in most applications. For example, they may be subjected to chemical sprays, flying debris, and other physical abuses that we would not think of exposing more expensive lighting equipment to.

4) Availability. Most industrial dealers stock these lamps regularly, so they can be procured without undue delays in quantities required to fulfill special requirements. The ready availability of these lamps is of vital importance to the photographer whose assignments carry

(*continued on page* 71)

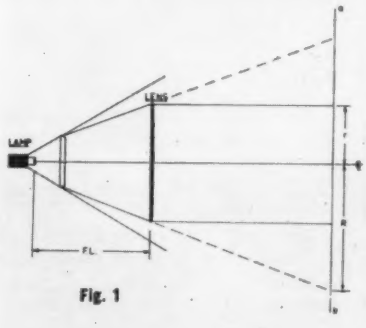

Fig. 1

Fig. 1. The function of the Fresnel lens is shown here. At the subject plane a-b, the cone of light intercepted by the lens illuminates an area $2\pi r^2$. Without the lens, the same light would be distributed over the much larger surface $2\pi R^2$. The ratio of illumination with and without a lens is approximately: $IL \div IO = (DFL)^2$, where IL is the illumination at the subject plane with a lens, IO is the illumination at the subject plane without a lens, and DFL is the lamp-to-subject distance measured in focal lengths. The diameter of the illuminated area for a collimated beam is equal to the focal length divided by its f-value.

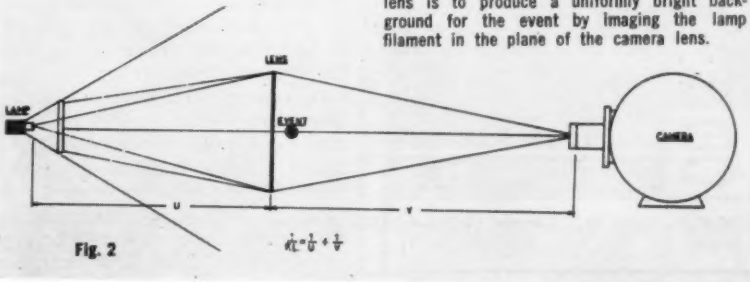

Fig. 2

Fig. 2. In this set-up, function of the field lens is to produce a uniformly bright background for the event by imaging the lamp filament in the plane of the camera lens.

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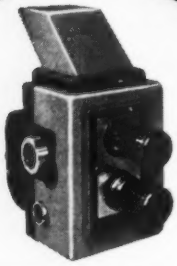

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Ernest E. Reshovsky

PHOTO INSTRUMENTATION

Satellite cameras may orbit orbits of complex future satellites

Satellites have been observed and photographed from the ground and satellites have carried their own cameras aboard. Now it has been proposed that orbiting satellites be accompanied by their own orbiting electronic "photographers." The proposed technique is based on a new type of electronic camera under development by RCA for space applications.

The technique will work this way: The satellite to be observed would be accompanied into orbit by a separate camera-carrying vehicle, launched either in the same carrier rocket or launched on its own. In space the camera would travel about 100 ft. away from the main satellite, and could maneuver about it in accordance with a prearranged program, in order to view its operation from various angles. The camera unit would be kept on course near the subject with the help of a tracking system using a pulsed electronic light source, which would at the same time provide illumination for picture taking purposes when both of the satellites are in the earth's shadow.

The RCA camera under development would record the pictures which would be stored aboard until receipt of a command signal from the ground to the camera-satellites scanning transmitter.

The need for such a system was described by Spencer Spaulding, Manager of Advanced Projects Analysis, RCA Astro-Electronic Products Div., Princeton, N.J.: "Future satellites can be expected to be larger and more complicated, with exterior fixtures such as large solar energy collectors or antennas. These satellites also will be stabilized to a preferred orientation in space. During the testing of such satellites in orbit, a camera for taking high-resoluion pictures throughout the orbit would be highly desirable. The new proposed technique would permit a close check on the performance of the various features of the satellite and it would be possible to study its surface characteristics in order to see the effects of micrometeorites and radiation." Photo instrumentation with its enormous storage capability per area will be a natural means for such studies.

More on radiation effects

In April 1960, this column described some of the effects of radiation on photographic film.

Besides the mentioned "outside" radiation sources there is another one, i.e. radiation emitted by some of the rare earth glasses in lenses.

Dr. Heinrich Klarman, Head of the Testing Labs of the Schneider Lens works, in Kreuznach, Germany, has made quite a study of lens glass radiation.

He points out that natural radioactive elements such as thorium, used in lens manufacture emit alpha, beta and gamma rays.

However, tests conducted with thoriated glass yielded significant conclusions for camera users:

An aluminum foil of .011mm thickness was placed between thorium glass and the emulsion and it absorbed all radiation during a five-week test period. The shielding effect of the foil is equal to that of an air space of ¾ in.

It was also found during the tests that significant radiation can reach the film only if the rear element of a lens system is made of radioactive glass such as thorium, and if such an element remains over the same piece of unprotected film for a long period of time.

If the rear element is made of glass containing non-radioactive rare earths such as lanthanum, all radiation from any of the other elements is shielded from the film.

Just for your peace of mind: nearly all lenses made nowadays, which contain rare earth elements, carefully omit the use of thorium in the rear elements.—THE END

HYZER ON HIGH SPEED

(*continued from page 69*)

him to distant cities. It is often cheaper to purchase lamps and clamps on location than to pack and ship them from the home plant.

5) Versatility. An attribute that arises as the combined result of all the above factors, is the broad versatility of these lamps. A good photographic technician might be defined as a person who not only produces high-quality pictures, but is flexible to demand and opportunity. This same attribute is reflected in the tools he uses. The vast majority of high-speed photographic lighting problems can be handled with sealed-beam incandescent lamps plus a little ingenuity. Future articles will serve to illustrate this point, so for the sake of brevity, only one example will be discussed.

Subject illumination produced by the above lamps falls off according to the inverse square law, which means that the light level received by the subject decreases very rapidly as the lamp-to-subject distance is increased. In applications where the lamps cannot be grouped close in to the subject, the problem of obtaining the required illumination may appear insurmountable. Often this can be solved by interposing a large diameter f/1 to f/1.5 Fresnel lens between the lamp and the subject. Mounted one focal length's distance away from the lamp, a collimated beam of light is produced by the lens (*Fig. 1*) that may be projected for considerable distance at high intensity.

An example of more efficient utilization of light is shown in Fig. 2, where the subject appears as a silhouette against a field of light generated by the tungsten lamp and imaged within the entrance stop of the camera lens by the Fresnel field lens. Large diameter plastic Fresnel lenses may be obtained from the Eastman Kodak Co. and the Edmund Scientific Co., the latter in Barrington, N. J. Heat generated by the lamp may distort the plastic unless the infra-red is removed by a suitable filter consisting of heat-absorbing glass, a water cell or most effective, a Kolle culture flask filled with a dilute solution of cupric chloride. More on Fresnel lenses next time.—THE END

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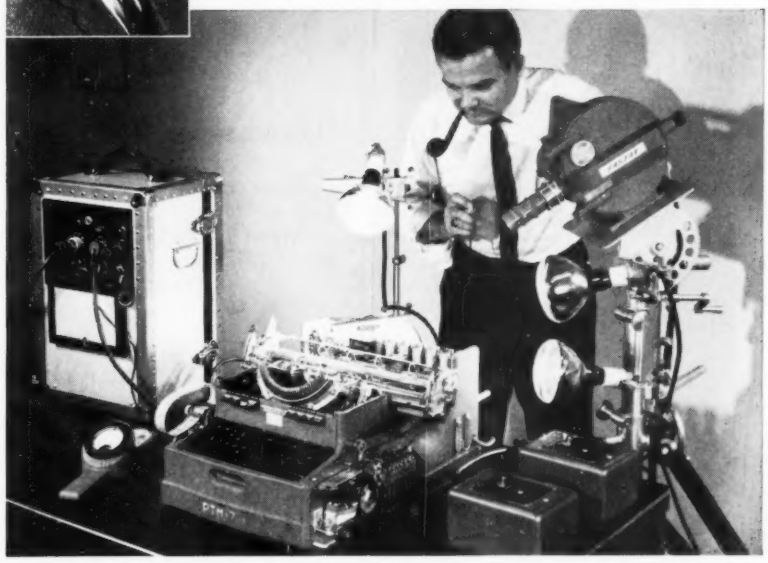

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TOOLING T

Large scale templates for tooling purposes are produced in-plant as just one aspect of Sikorsky Aircraft's high flying Engineering Reproductions Department—Roland G. Blankley, Supervisor

For years Sikorsky Aircraft has been using loft drawings and reproductions from them for tooling purposes. Up until three years ago, this type of reproduction was being purchased from an outside source and the majority of the original loft drawings were scribed on white painted steel stock. Upon moving into the new Engineering addition, in its new Stratford plant, all this has changed. The first change, which was actually started before the move, was to change the materials used for loft drawings. The basic lines are still scribed, but instead of being scribed into white coated metal, they are now scribed onto Mylar which has been given two coats of paint. The first coat is green and the second coat is white. This scribe coated Mylar makes a perfect negative for subsequent reproduction onto Van Dyke coated metal, Mylar or Cronar. At the same time, the undercoat of green shows through the scribed areas and provides a good sharp image for a photographic reproduction in a process camera. Once the basic lines have been drawn, the loft drawings themselves are drawn on a 0.007-in. matte finished Mylar. All Mylars are rolled on cardboard tubes and are normally kept in a vault, stored in metal "Sta Cor" cabinets especially made for this purpose. Care must be taken not to roll Mylar too tightly for fear of creating a temporary set.

The chain's first link

Upon notification from the Engineering department that a loft drawing has been released, Manufacturing Engineering then issues a request to Engineering Reproductions for the required number of Mylar, steel and/or aluminum, full or partial copies as may be required by their tool planning commitments. These copies will be

John Hird is seen in a portion of Sikorsky's vault of loft drawings.

John Hird and Vincent Siedlecki coat an aluminum sheet in Dietzgen unit.

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TEMPLATES

used as masters, cut up and filed to lines for routing templates, drill templates, etc.

In Engineering Reproductions, the material called out is pulled from stock and coated. Two basic materials are used in the coating procedure. One, the Van Dyke coating, is used in conjunction with a scribed original or a camera negative. This is a negative process whereby a black line prints as white and a clear area prints as black. With a scribed original, the Van Dyke method will give the best reproduction. The second material is a diazo positive material which reproduces a black line as black and the clear area as white. The majority of reproductions are made on metal. This can be anodized unsealed aluminum or any other aluminum, steel, magnesium or wood painted with an iron free paint. The material upon which the reproduction is going to be made is coated with Dietzgen Directo TS-205R sensitizer in a Dietzgen Metal Template Sensitizing machine capable of coating 60-in. wide stock, up to 1 in. thick and practically any length. Sikorsky's vacuum frame limits the length to 12 feet. The coating operation is very simple. The operator feeds the piece into one side of the machine and it is fed automatically out the other side. The Directo material is dry upon coming out. The Van Dyke material requires 10 to 15 minutes drying. The entire operation from beginning to end can be done under ordinary room lighting, although gold fluorescent tubes are recommended.

Image is burned-in

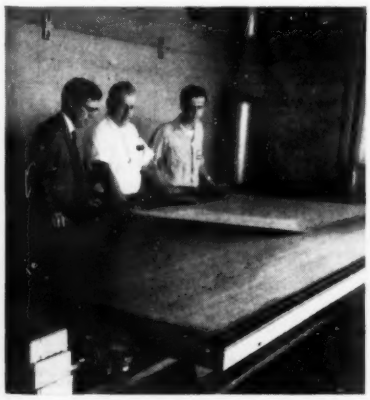
The sensitized material is then moved into the 5 x 12-ft. vacuum frame and the negative, scribe-coated Mylar or loft drawing on Mylar is placed over the top, the glass is lowered, vacuum applied and the entire frame is rotated into position for the exposure (*see picture*). The exposure is made for 8-10 min. to a bank of fluorescent tubes. The exposed material is then removed from the vacuum frame and placed in the developing rack designed and built by Sikorsky Maintenance department and a one step developing liquid is rubbed over it with a cotton rag. After a brief spray wash, and squeegee, the finished template is ready for the shop after an elapsed time of 15 to 20 min. from the start of the coating operation of bare metal; and the entire operation is performed in a fully lighted room.

This method has been used to make actual skins for an aircraft where one piece is involved. The sheet of aluminum is painted, coated and printed. The part is cut out to the lines, and the holes drilled. After the paint is stripped, a completed part is available. Numerous temporary tools on plywood have been made by this method. Transparent checking fixtures are made by exposing the original loft Mylar to Dietzgen .0075 Dri Print sensitized Mylar.

The electrical harness group in the shop lays out their master boards on vellum and all the copies required are then reproduced onto white painted plywood. A pre-sensitized adhesive backed Mylar is available for making additions and corrections to existing Mylars.

Important cost factors

This system of making loft reproductions has enabled Sikorsky to save a large sum of money. In the first two and one-half months of operation, equipment costing a total of less than $13,000.00 including installation, more than paid for itself. This did not include the hidden savings of shipping and receiving costs, the cost of Manufacturing Engineering personnel required to expedite shipments nor the costs of Engineering Loft personnel formerly required to trace portions of an uncompleted loft drawing to give the tool shop lead time.—THE END



Roland Blankley, Supervisor, with Hird and Siedlecki at vacuum frame.

Vacuum frame in exposing position. Lighting is supplied by bank of lamps.

After exposure sheets are processed on Sikorsky designed developing rack.

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PMI IN-PLANT REPRODUCTION

Herbert P. Paschel

GRAPHIC ARTS

Who thought of it first? A lot of bright ideas go way, way back

In the last ten years or so the use of office photocopying machines and systems has seen a tremendous growth. Such methods as Gevacopy, Thermofax and Verifax are obviously of recent invention. Although they differ in the manner in which they produce a duplicate image, they all have one thing in common —the principle of reflex copying, also called cameraless copying.

Reflex copying is a contact process in which a line original to be copied is sandwiched together with sensitive material with the image (text) side of the original in contact with the light sensitive emulsion. The sandwich is oriented in the contact frame or printer so that the exposing light first passes through the sensitive material—the transmitted light then strikes the matter being copied. Obviously, the light areas of the original reflect light, the dark areas (type) absorb it. With correct exposure only the areas that have received both transmitted and reflected light will blacken upon development. Reflex copying was originally a negative-positive process—the first exposure resulting in a negative from which positive prints can be made by conventional contact printing. Modern systems are either direct positive (Thermofax), or yield positive images by physical transfer (Verifax), or reversal transfer (Gevacopy).

Care to take a guess on how old, or how new the reflex principle is? Reflex photocopying was invented by—a) Daguere b) George Eastman c) H. Goodwin d) A. Breyer. The date of the invention is—a) 1921 b) 1888 c) 1839 d) 1937.

Answer: Albrecht Breyer, of Berlin, made reflex copies of printed matter as early as March 1839. The first public record of the invention appeared in the journal *L'Espoir*, on April 9, 1839. A report by Breyer was read at a meeting of the Academy of Science in Brussels on November 9, 1839. Initially, the process was called Reflectography and and Breyertypy. Breyer's invention evidently fell into disuse for, in 1896, J. H. Player commercialized the very same idea under the trade name Playertype.

Another question

With the profusion of color films currently available it is hard to imagine that materials based on color development were introduced commercially only about 25 years ago. Although most modern color films rely on color coupling (secondary color development), a dye image developed simultaneously with a silver image by the developing agent (primary color development) is the forerunner of today's methods. Very few readers are likely to be aware when primary color development first took place. Before reading further see if you can pinpoint when this memorable event occured. Was it a) 1847 b) 1851 c) 1905 d) 1912 e) 1930.

The majority of organic developing agents, even those normally used for black-and-white work will, in certain types of solutions, produce colored substances together with the silver image. With the common developing agents the colored components are, in most cases, extremely weak and thus unnoticed. The one exception is pyro which produces a strong yellowish-brown stain. Pyro was one of the first organic developing agents to be used in photography. Thus, the original silver-dye image (primary color development) was undoubtedly the very first silver image ever developed with pyrogallic acid (pyro). The precise date is somewhat in doubt but the event certainly occured before 1850.

Niepce, Archer & others

Early in 1847 Niepce de Saint-Victor invented the art of producing photographic images on glass plates using albumen as the binder

(*continued on page* 80)

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PMI IN-PLANT REPRODUCTION

Vernon Tate

MICROREPRODUCTION

Newspapers stay fresh longer in micro form; besides, it's cheaper

In practice, few newspapers are interested in microfilming their own files. Usually they are happy to turn to contractors with the very special know-how required to cope with the problems that almost invariably arise. A few of the largest libraries are equipped to film newspapers but the current trend is in the direction of a few firms specializing in the field. Some of these produce in excess of 1,000,000 ft. of *negative* per week. Negatives, incidentally, are used only for printing positives. They are stored in vaults and are handled under meticulously controlled conditions. Consequently they are expected to last indefinitely. As libraries continue to expand their holdings of newspapers on microfilm, the time may come when a paper file is a rarity. It is actually cheaper to purchase a positive microfilm copy than it is to bind an accumulation, and the storage costs are lower.

By-products

There have been some interesting by-products of this development. One of these was the reaction of the ultimate consumer, the reader. At first there was considerable opposition as might be expected from something so apparently revolutionary. There were loud wails of eyestrain (this being before the days of popular television . . . nowadays little is heard of this objection *from those who have used microfilm*) and many other complaints. Gradually as the initial novelty wore off it became apparent that it was actually much easier —and with a little practice much faster—to run through a microfilm file of newspapers than it was to consult the bulky and often disintegrating old bound files. The dry cleaning bills were also much lower, for powdered newsprint clings closer than an apprehensive editor after a late column.

Again, success led to other newspaper applications of microfilm. Banking and billing uses might have been predicted in view of the progress made in other commercial fields, but an alert newspaper librarian, Chester Lewis of *The New York Times,* seized upon the technique as an answer to a perennial headache, notably the preservation and use of the "morgue." All large papers maintain a prized collection of clippings and other data on a great many subjects to which reference is made from time to time, and which is traditionally known as "the morgue." The title is quite appropriate, for the collection though classified is usually in chaos, and since it is made up in large part of newsprint is certainly not permanent. He decided to use 70mm microfilm and placed several clippings on a frame. The positive was cut up and unitized by placing each frame in an acetate jacket for indexing and filing. Special reading machines were designed and built, and at last report the system was operating to the satisfaction of all concerned.

Trials have been made from time to time of newspapers on *microfiche,* that is in the form of film sheets, and as *micropaques,* that is in strip, card or page form on opaque base and intended to be read by conventional micropaque equipment. The latter are interesting, for if produced by a printing method rather than photographically, they would open the way to easy edition production. But acceptance has been spotty.

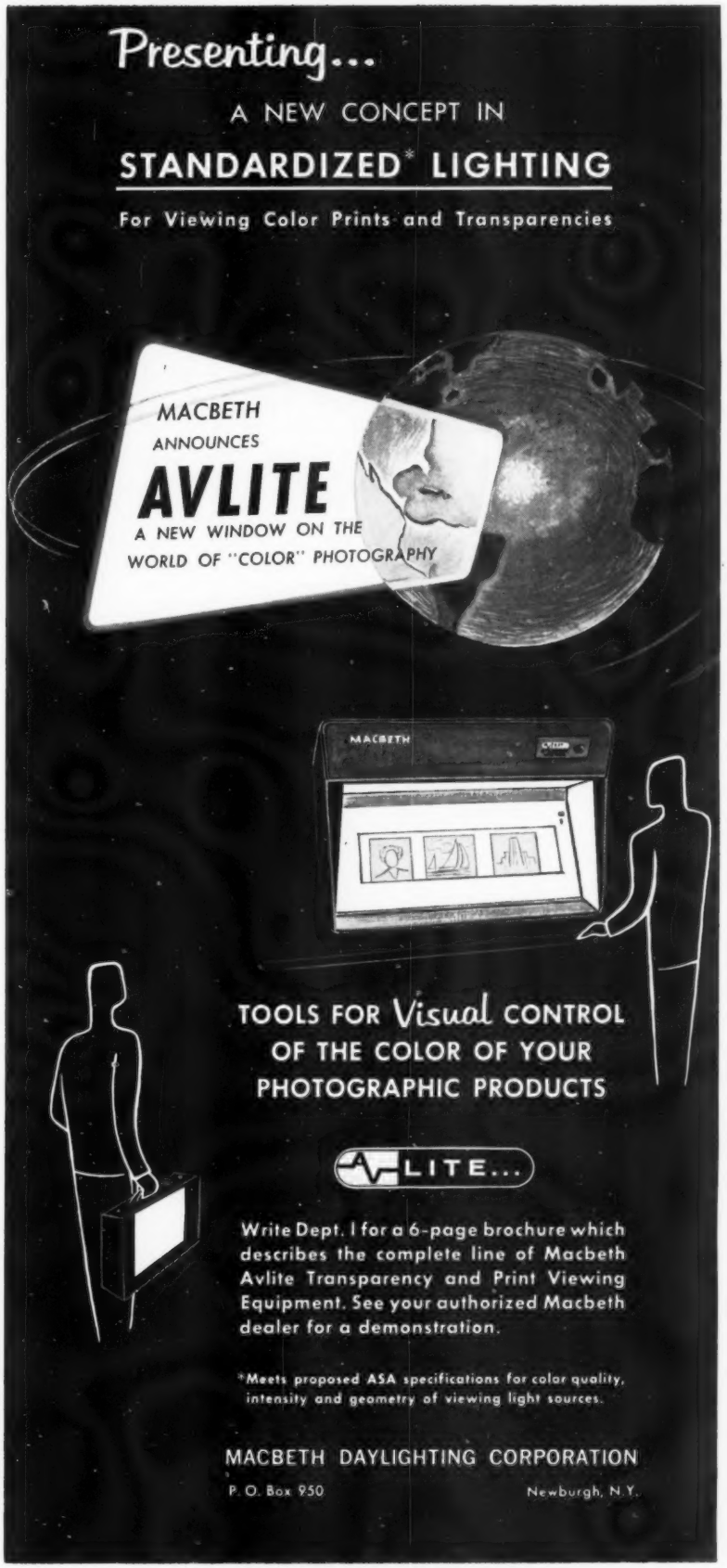
Microfilm certainly owes a great deal to newspapers and the reverse is equally apparent. The significance of this brief summary of a most important development in microfilming lies not only in the fact but also in what it may suggest for the future. The time is not yet when newspapers will be produced and published on microfilm, although the possibility has been investigated. There is no handy pock-

et reader which will allow newspaper or other microfilm to be read in comfort on a bus, the subway or even in an automobile, although steps in this direction have been taken and there are even now several ideas in the works. There is no telling what the future holds.

Newspapers are not the only—and are possibly not the most important—class of documentary record menaced by paper deterioration. One of the really serious problems facing research and technical libraries and their users is the fact that so many books and periodicals have been printed on poor-quality, chemical-filled paper that cannot last. Business and industrial files, personal and public archives and many other kinds of records are far from immune. Sometimes under the guise of "economy" a poor paper has been used for an important work. If memory is correct, Einstein's first published essay is on paper of this description. In time of war or depression often no other alternative is available. The cumulative results pose a very definite hazard for the future. Many publications of scientific and learned societies in this country and abroad even now are in serious condition. Libraries can acquire complete files for use but they have not yet been able to insure their perpetuation. Deterioration continues in storage regardless of use.

Considerable study has recently been devoted to the problem of a suitable paper for new books. Under a grant from the Council on Library Resources, the Virginia State Library sponsored two research projects by W. J. Barrow. They have been reported in two monographs, *Deterioration of Book Stock, Causes and Remedies*, (1959), and *The Manufacture and Testing of Durable Book Papers*, (1960). Those who are concerned with textual longevity will find them most useful. The second paper outlines specifications for the manufacture of suitable paper, and is in fact printed on paper made to this specification.

Regardless of the future, there exists a vast and important backlog of materials now in print and well along the road to eventual disintegration. The microforms offer the most promising, indeed the only currently feasible remedy. Work is now going forward but the volume is pitifully small in comparison to the need. For those with ideas and courage the future looks bright in this area.—THE END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BORE HOLE CAMERA

(*continued from page 67*)

ously illuminates the bored hole and exposes the camera film to the mirror image as a shutter would.

Directly above the quartz lens is a conventional double 8mm moving picture camera with motor and spool drive synchronized by the pulsing current that actuates the flashtube. The camera is designed to make 16 flash exposures per vertical ft. of boring. Thus, with a 1-in. section of drill hole exposed at each flash and 16 exposures per ft. of boring, sufficient overlapping from picture to picture for a continuous film continuity is assured.

On the ground surface the camera is controlled by a lowering device consisting of a pay-out reel containing 500 ft. of camera cable. The camera cable, with a tensile strength of 2,700 lbs., passes over a level-wind control, geared to a 16-notch pulsating wheel and depth counter. The apparatus is "hand-cranked" with a gear drive to a cable pay-out reel for lowering and raising. Attached to the lowering mechanism is a small power supply cabinet that transforms 117-volt A.C. to 3 D.C. circuits of 450, 50 and 50 volts respectively. The highest of the voltage is transformed to 15,000 volts in the flashtube of the camera. One 50-volt circuit is connected to the camera motor drive and synchronizing relay. The other 50-volt circuit provides the synchronizing impulses.

Dry run

In actual operation, as a precaution against camera loss or damage by jamming in a bore hole, a dummy camera of the same weight and dimensions is lowered and retrieved several times before the real camera is put to use. The camera pulsing wheel is geared to the crank and gear drive of the cable reel and guide reel, so the time interval between picture exposure is controlled by the speed at which the hand crank is turned. With the camera capacity being 25 ft. of double 8mm film, more than 75 ft. of boring can be photographed continuously without reloading. In dam site explorations, bore holes average 150 ft. in depth, with a large percentage being beneath the water surface of the river bed. The bore hole camera functions perfectly, even in these water-filled bore holes.

Equally as unique as the camera from the standpoint of optics is the device developed to project the overlap film frames obtained by the camera. This projector transforms the pea-sized, doughnut-shaped image which the camera's cone mirror impresses on each double 8mm film frame into a true-to-scale cylindrical image. Through the projector a three-dimension projected picture in its truest sense is possible, simulating the panoramic interior of the bore-hole walls as accurately as if a geologist were viewing it by eye.

Each picture accurately presents the depth, orientation and dimensions of every feature of the explored rock. The color film discloses visual information as to its composition, texture and soundness. The geological advantages of this pictorial explanation record of rock cores are principally that conjecture regarding core losses is eliminated. Orientation (dip and strike) of faults, fractures, contacts, bedding planes and other structural features of the rock can be determined easily and accurately by the visibility of the camera compass needle recorded in the center of each film frame.

While the replacement value of the Walla Walla District's "NX" Bore Hole Camera alone is set at over $12,000, a far greater cost factor must be considered when research hours are taken into consideration. However, the economic and cost saving potentiality in drilling expenditures more than justifies this experimental expenditure. Through the information derived from the recording compass, furthermore, such details as the tilt of rock strata can be determined positively. This leads to improved specifications for contracts covering excavation work, which results in more realistic bidding.

When bids are invited for the first step construction contracts at multipurpose dams, contractors and their estimating engineers now have access to basic geological and subsurface foundation information undreamed of a decade ago. Not only will the contract bidders have access to the usual diamond drill core boring logs detailing subsurface geological formations for the area, color photographs taken inside the 3-in. drill hole borings from bottom to surface over the broad general foundation area of the dam site will also be available. This photographic continuity pertaining to the entire dam site area is possible only through the use of this newly-developed "NX" Bore Hole Camera.—THE END

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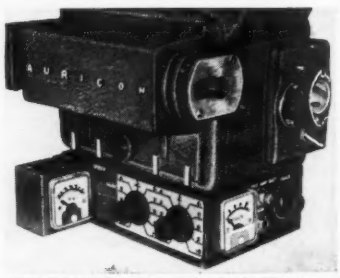

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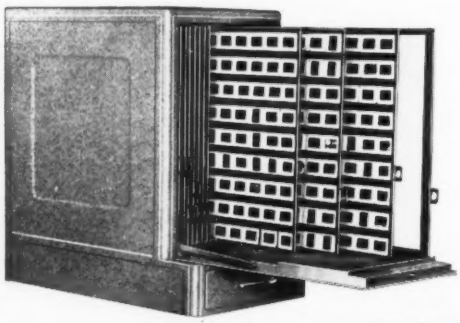

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GRAPHIC ARTS

(*continued from page 74*)

for the sensitive salts. He first used gallic acid for development but later substituted pyro. Pyro was also used as a developing agent in connection with the wet-collodion process introduced by F. Scott Archer in 1851. In that same year two scientists, quite independently of each other, proposed the use of pyro as a developer in the Calotype (Talbotype) process.

The exact nature of pyro developed images was a matter of conjecture for many years. The existence of a separate, secondary image was finally proved by A. Watkins in 1896 when he published the results of his tests that indicated the typical brown pyro stain was not silver, but that the density of the stain was proportional to the silver density. Another photographic pioneer, Lüppo Cramer, then proved that the stain was due to an organic dye formed during development.

Sleeping giant

Surprisingly, the principles of color development, accidently revealed by the inherent properties of pyro, lay dormant for a long time. The work of Lumiere, Desalme, Seyewitz, Homolka and others finally established the principles of primary color development at the turn of the century. Primary color development did not prove to be a reliable or workable system mainly because of the instability of the solutions, lack of brilliant colors, inadequate color gamut and other factors. Research turned to the secondary systems which offered a wide variety of organic compounds that would form a dyestuff with the oxidation products of development.

In 1911 Fischer and Siegrist were issued patents on the systems and materials which can be considered the foundation of modern color-coupling materials. But it took several decades of further research and experimentation to realize a practical process. It was not until 1935 that Kodachrome was marketed, to be followed shortly after (1936) by Agfacolor Reversal. Once the parade got started hardly a year has passed that did not see the introduction of one or more new materials, all of which owe their existence to the color forming system that, quite accidently, was revealed by the first organic developing agent ever used.—THE END

References: "History of Color Photography," J. S. Friedman ● "Basic Photographic Chemistry," Keith M. Hornsby ● "History of Photography," J. M. Eder

FREE LITERATURE

For your copy of any free literature item, circle the appropriate number on the readers' service card, attached, page 85.

AUDIO-VISUAL

REAR PROJECTION OF SLIDES 201
Genarco, Inc. Brochure, *Rear Projection of Slides in Large Meetings,* describes rear projection, its advantages, how to select projection equipment and technical information for its installation.

POLAROID TRANSPARENCIES 202
Polaroid Corp. 6-page folder, *Slides on the Spot,* describes the new Polaroid transparency system. Also lists accessories, equipment needed and prices.

MICROPHONE BOOM 203
Cinequipment International. 4-page illustrated brochure describes in detail the Fisher microphone booms designed primarily for the motion picture industry.

PROJECTION 204
Laboratory Furniture Co., Inc. 6-page illustrated folder describes the Act-O-Matic dual-position projector.

SLIDE VIEWER 206
Walter Voss, Inc. Illustrated catalog sheet describes the Kindermann Amato slide viewer. List of accessories and prices.

OVERHEAD PROJECTION 205
Minnesota Mining & Mfg. Co. 12-page illustrated booklet, *Overhead Projection Tips,* describes system and explains the use of the template. Includes template for minimum image size.

CAMERA & LENS

CONTAREX 207
Carl Zeiss, Inc. Illustrated folder describes the Zeiss Ikon Contarex. Includes list of accessories and prices.

REGISCOPE 208
Regiscope Corp. of America. 4-page illustrated folder describes the Regiscope system and its single and dual-lens Regiscope cameras.

FILMSTRIP CAMERA 209
Camera Equipment Co., Inc. Three-hole punched specification sheet describes the CECO 35mm filmstrip camera.

MULTIDATA MAGAZINE 210
Flight Research Inc. Three-hole punched sheet describes in detail the 200-ft. Multidata M-1 16mm film magazine for use with the Multidata Models III and III-B.

EQUIPMENT

INSTRUMENTATION EQUIPMENT 211
Flight Research Inc. 8-page illustrated catalog describes photographic instrumentation equipment including cameras, automatic exposure controls and intervalometers and control circuits.

STATICMASTERS 212
Nuclear Products Co. Illustrated price sheet describes the Staticmaster brushes and ionizing bar for static elimination.

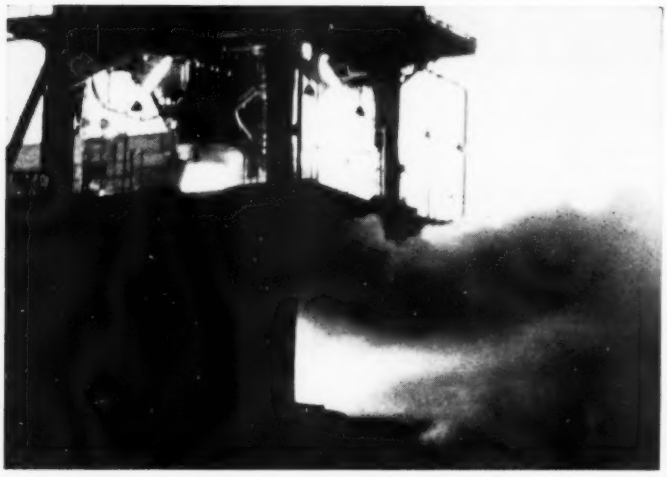
STUDIO LIGHTING 213
J. G. McAlister, Inc. 6-page illustrated folder describes controlled studio lighting. Includes specifications and list of accessories.

MONOBATH METHOD 214
Edwal Scientific Products Corp. Information bulletin describes Edwal Controlled Monobath Method by which a film can be developed and fixed using 1 oz. of developer concentrate and 1 oz. of fixer concentrate.

DEMONSTRATION TABLES 215
Laboratory Furniture Co., Inc. 4-page illustrated folder describes portable science demonstration tables. Gives complete specifications.

TRIGGER TRANSFORMERS 216
Nems Clarke Co. Information sheet on the Megalume trigger transformers.

AUTEX* catches the flame



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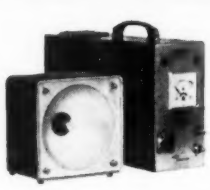

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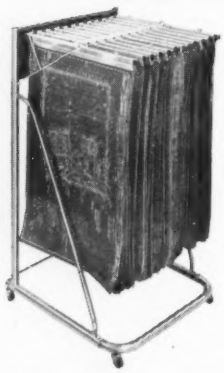

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Karl Heitz, Inc. Illustrated brochure describes the Kern Alpin and Pizar classic type binoculars, Focalpin binoculars and Kern monoculars and telescopes.

PROCESSING EQUIPMENT 217
Time-O-Lite. 12-page illustrated catalog describes Bar-Ray processing equipment including stainless steel sinks, automatic film processing and temperature control and refrigeration.

ECONOMY SPOTLIGHT 218
Times Square Stage Lighting Co. Illustrated specification sheet describes the 750-watt economy spotlight available from this firm. Includes prices.

DEMINERALIZED WATER 219
Enley Products, Inc. 6-page illustrated folder describes the Enley ion exchange water demineralizers. Includes specifications and prices.

DARKROOM LAMP 220
Lester C. Hehn Engineering. Illustrated specification sheet gives information on the Stop-Lite miniature darkroom lamp assembly. Includes prices.

PHOTOGRAPHIC LITERATURE 221
Lester C. Hehn Engineering. Listing of photography books, pamphlets and catalogs for sale, including rare, scarce and modern items. Includes prices.

LIGHTING DATA 248
General Electric. 44-page booklet, *Photolamp and Lighting Data,* includes revised A.S.A. numbers and the new DAN movie lamp.

ENLARGING EQUIPMENT 222
Simmon Bros. 18-page illustrated enlarging equipment manual cross indexes all useful purposes of Omega enlarging equipment specifying correct accessories. Includes magnification charts.

PLASTIC LAB WARE 223
The Nalge Co., Inc. 24-page catalog provides data on complete line of unbreakable, corrosion-resistant plastic laboratory ware including Buchner-type filter funnels and 125 ml. Erlenmeyer flasks.

GASEOUS CONDUCTION TUBE 224
Amglo Corp. Illustrated folder describes the Amglo gaseous conduction tubes. Gives specifications and prices.

DISPLACEMENT FOLLOWER 225
Optron Corp. 24-page illustrated catalog describes in detail the Model 701 optical device for measuring displacement and vibration. Lists applications.

COLD LIGHT PRODUCTS 226
Mervap Cold Light Products. 4-page folder describes the 1961 line of thermocontrolled cathode grid cold lights.

AUTOMATIC PROCESSING 227
Murmatics. Illustrated brochure describes the Murmatic processor for automatic conveyance and control of any photographic process. Includes prices.

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FACTS ON ENLARGERS 228
Charles Beseler Co. 32-page booklet, *Facts About Investing in the Right Enlarger*, clarifies the various types of enlargers, their basic components and special functions. Includes a supplement on enlargers in categories for beginner, experienced amateur and professional.

COLOR PROCESSING UNITS 229
Leedal Inc. 4-page illustrated folder describes Leedal color processing units with automatic gas burst agitation and automatic temperature control. Includes specifications and prices.

DRIERS 230
Simplex Specialty. Illustrated folder shows and describes industrial driers. Includes complete specifications.

POCKET MICROSCOPE 231
Karl Keitz, Inc. 4-page illustrated leaflet describes the Omag pocket microscope with built-in illumination. Includes specifications and list of accessories.

LIQUID NEOPRENE 232
Pro-Chem Co., Inc. Application instructions for Pro-Chem liquid, air-curing neoprene. Includes information on preparation of surface and instructions for brush or spray application and application for skid-proofing.

PRE-PRINT INFORMATION 233
Criterion Film Labs, Inc. 16-page booklet gives general information on the handling of pre-print materials. Includes list of services available from this New York lab and prices.

HYDROFLUID TRIPOD 234
National Cine Equipment, Inc. Illustrated catalog sheet describes the silicone dampened hydrofluid, ball-leveling pan and tilthead tripod. Specifications and prices.

PRESTO-SPLICER 235
Prestoseal Mfg. Corp. 4-page illustrated leaflet describes the Miracle Presto-Splicer which uses the butt-weld method. Includes specifications.

MACEYMATIC COLLATOR 239
Macey Co. 4-page folder describes the eight-station Maceymatic collator for 5 x 8 to 9 x 12-in. sheets. Information on folding and stapling accessories.

TRIMMER-CUTTER 241
Bienfang Products Corp. Illustrated catalog sheet describes the Metrocut cutter-trimmer for sheet sizes up to 51 in. wide. Includes specifications.

GRAPHIC ARTS

FERRIS INSTITUTE 236
Ferris Institute. Illustrated brochure describes training program for visual reproduction technicians.

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Simplimat Corp. 24-page catalog of supplies and services for Multilith and Davidson duplicators. Includes folding machines and mail room equipment listing. Prices included.

REPRODUCTION LIGHTING 240
Natural Lighting Corp. 8-page illustrated booklet, *Lighting in Reproduction*, gives standards for lighting system in lithography and engraving, describes various types of lighting and explains the Color-Tran system.

MAILING COST FOLDER 242
Potlatch Forests Inc. 4-page folder gives postal information for mailings of catalogs and brochures. Includes a list of Potlatch papers for offset.

HOT PRESS LETTERING
QQ Titles. 30-page catalog illustrates specimens of type available for titles, A-V slides, etc. For your copy write on company letterhead to: QQ Titles, 247 W. 46th St., New York, N. Y.

INSTANT LETTERING 250
Arthur Brown & Bro., Inc. Folder explains how "instant lettering" works and gives illustrations of type available.

TYPE SELECTION 251
Hot Press Co. Sheet illustrates type faces available. Includes silk screened chart showing 24 colors they come in.

SERVICES

PRICE LIST 243
Video Film Laboratories. List gives prices for developing and printing 16mm Anscochrome, black-and-white reversal, black-and-white negative and black-and-white positive film. Editing prices given.

RATINGS ON FILM 244
Modernage Photographic Services, Inc. 4-page pocket guide for A.S.A. ratings on black-and-white film.

LIST OF SERVICES 245
Modernage Photographic Services, Inc. Folder lists services available from this New York firm including projection printing, contact printing and developing. Gives prices and information on special services.

PHOTOGRAPHIC SERVICES 246
Meteor Photographic. 10-page catalog of technical information and prices of services available for black-and-white and color from this Detroit firm.

COLOR PRINTS 252
Ralph Marks Color Labs. 12-page booklet, illustrated in color, describes services available from this New York firm. Includes prices.

B&W OR COLOR SERVICES
Meteor Photographic. 8-page catalog of laboratory services and prices lists line of custom and quantity printing. Request on company letterhead from: Meteor Photographic, 4630 Oakman Blvd., Detroit.

NEW PRODUCTS

For additional information on any new product circle the appropriate number on the readers' service card, page 85.

MOTOR-DRIVEN ARC LAMP 101

Four models of the nuArc Flip-Top platemakers are now available with a motor-driven arc lamp mechanism for greater light intensity, constant light value and uniform coverage, according to the manufacturer. The mechanism incorporates a magnetic amplifier which controls the feed of the carbon automatically. Prices: $845 to $1995.

REMOTE CONTROL PROJECTOR 102

Remote control focusing without "coasting" is a feature of Bell & Howell's 754 RF Focus Tronic Explorer 35mm slide projectors. Also featured are a Pointer-Ray beam of light for pointing out details on the screen and a built-in timer, which cycles from 3 to 30 sec. The projector offers 500W illumination and a 4-in. f/3.5 lens. Price: $179.95.

POLAROID FILM 118

In its formal announcement of the new 300 speed Polaroid Land film Type 57 for 4 x 5 cameras (*see* PMI, *Jan. 1961*), the Polaroid Corp. adds that its 200 speed Type 52 Land Film Packets for 4 x 5 cameras have been converted to 10-sec. development.

FILM MARKER 105

A new marking pencil called the Film Marker, manufactured by the Joseph Dixon Crucible Co., is an all-surface pencil for writing on film, on wet and dry coatings and on all glazed surfaces. It can be sharpened to permit fine writing.

ALPA 6C 106

The latest model 6c of the Swiss Alpa 35mm single-lens reflex camera features straight ahead 0° viewing, a built-in exposure meter, speeds from 1/1000 to 1 sec. and a self-timer from 1 to 20 secs. Prices: with Switar 50mm f/1.8 Apochromat—$399; with Macro-Switar 50mm f/1.8 Apochromat—$459.

COLORTRAN CONVERTER 119

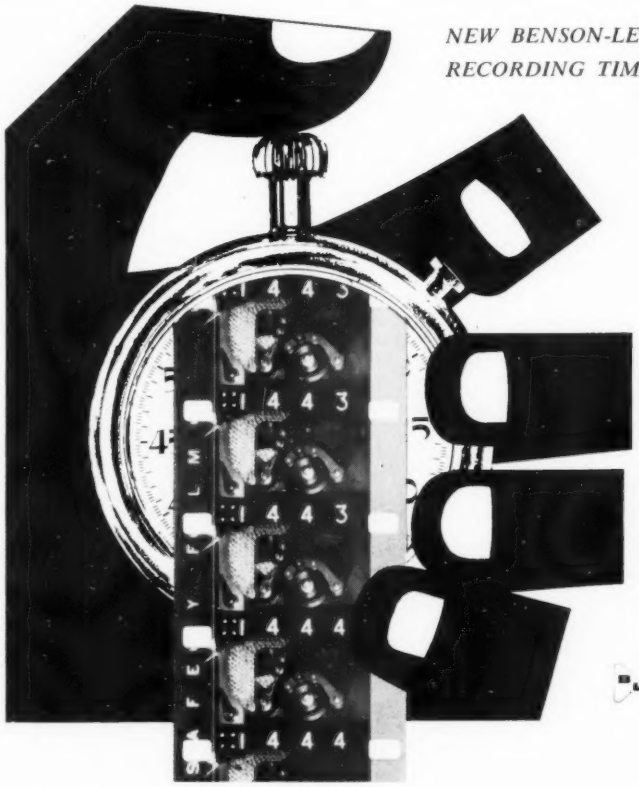
A new ColorTran converter, the Cinemaster Chief Mark II, with more output, greater control flexibility and improved construction for rugged location work has been announced by the Natural Lighting Corp. The new unit is said to accurately control the equal of ten 5-K's, or 50,000 watts of usable photographic light. The converter has six outlets, each independently controlled by color coded and numbered pushbutton switches. Exact color temperatures can be monitored and intensities may be selected and varied for each lamp or group on any outlet. Price: $309.

FLASH X-RAY SYSTEM 117

Fexitron has announced a 300 megawatt x-ray system designed for flash radiography of high-speed events in opaque media at velocities up to 20,000 ft./sec. (6 x 10^6mm/sec.) Film density of 0.7 is provided through 3 in. of aluminum at a film-to-source distance of 4 ft. and shadowgraphs in air at distances up to 19 ft. It is applicable for hypervelocity impact studies, chronography research, exploding wire and plasma research, pulsed radiation testing, shock waves studies and metal casting research.

KINOPTIK WIDE-ANGLE LENS 116

The Kinoptik 5.7mm f/1.8 Apochromat, a high-speed wide-angle lens for 16mm and TV cameras, which covers an extreme angle of 113°, can now be supplied with both a built-in slot for 2-in. sq. filters according to Karl Heitz, Inc.



NEW BENSON-LEHNER PUPPET PUTS DECIMAL RECORDING TIME RIGHT ON THE FILM

Forget guesswork. Eliminate tedious and inaccurate frame-counting. Now you can determine accurate recording time with Benson-Lehner's new PUPPET timing system. Copable of operating at 10, 100, or 1,000 counts per second. This compact three-unit system provides a new method of recording elapsed time DIRECTLY ONTO THE FILM *in decimal notation. Four event lights are also included in the format to allow for correlation of different cameras or of random events to each other and to real time. The display method can be used on any size film format . . . 16 mm. to 140 mm. and may be installed on intermittent motion and rotating prism cameras. Interesting? Write for details.*

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Get more information. Circle 408, page 85

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Get more information. Circle 442, page 85

REAR PROJECTOR UNIT **103**
A rear projection unit that can be used with 16mm projectors to produce clear 18 x 24-in. pictures under full room light conditions is now available from the H. Wilson Co. The Movie-Mover R-P unit consists of a portable table, a reflecting system, a lightproof projection box, a lenticular rear-projection vinyl screen and an adjustable mounting plate to receive a standard 16mm sound projector. A ⅝ in. focal length lens, available as an accessory, is needed on the projector. Price: $139.50.

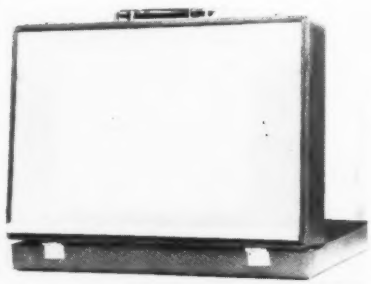
SOUND SLIDEFILM PROJECTOR **104**
An 11-lb. slidefilm projector, the Model "61," announced by McClure Projectors, Inc., provides sound accompaniment from either 33-1/3 or 45 rpm 12-in. records. An interruption switch allows the operator to interrupt the program at any point and resume immediately without loss of narration or picture continuity.

PLUS-X IN FILM PACK
Kodak Plus-X Pan Film in conventional film pack sizes has been announced by Eastman Kodak Co. Rated at ASA 160/5.5°, it is available in the following sizes: PX520 (2¼ x 3¼), PX518 (3¼ x 4¼), PX523 (4 x 5) and PX541 (9 x 12 cm.).

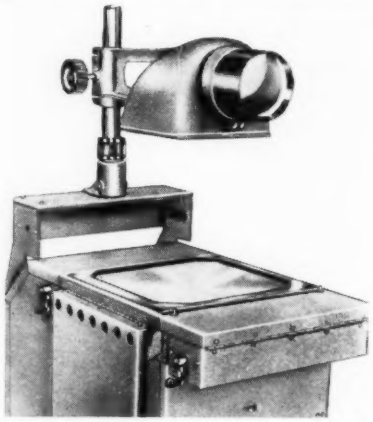
TAB-8 THERMOMETER **108**
The large-size Model Tab-8 thermometer with a 6½-in. diam. dial has been introduced by the Abrax Instrument Corp. Weighing 1½ lbs., the thermometer operates by metallic element, with percentage of accuracy claimed to be within 1 per cent over the entire range. Range of the dial is –30°F to 230°F. Price: $24.85.

180° LENS **110**
The Traid 735 Wide-Angle Lens with 180° field of view and high resolution, for 35mm cameras, has been announced by the Traid Corp. Primarily for use in drone scoring systems, it has many applications for security or surveillance. In an Eyemo mount, the lens has a focal length of 6.51mm and a speed of f/6.3.

TRANSPARENCY VIEWER **109**
Similar in size and appearance to an attache case, the Presenta Vue Portable Transparency Viewer, obtainable from Columbia Graphics, has a viewing area of 8½ x 11 in. that lights up automatically when a transparency mount is placed on the viewing rail. The standard model uses 110 AC while the Universal model has, in addition, a self-contained rechargeable battery for field use. Prices: standard–$75; universal $115.



BESELER OVERHEAD PROJECTOR **107**
The Charles Beseler Co. has announced its Master Vu-Graph Series 7700 overhead projectors. Featuring a "lower profile," the maximum projection-head height is 17½ in., the complete head measures



6 x 7 in. and the overall size of the projector housing is 23 x 12½ x 12⅝ in. Accepting 10 x 10 in. transparencies on its projection stage, the machine projects a 1000W full-color image as large as 13 by 13 ft.

ACCURA SQUARE SHADES **111**
Accura square lens shades to fit standard Series V, VI, and VII adapter rings are now available from the Photographic Importing & Distributing Corp. The black anodized shades are priced from $2.95 to $5.50 and feature a locking flange for controlled positioning.

FILAMENTS AND BOATS **112**
A new line of tungsten, tantalum and molybdenum filaments and boats, for photographers who coat their own lenses, are now available from the Electronics Div. of Allen-Jones, Inc. Manufactured for use in high vacuum as an evaporation source, they are particularly applicable to electronic component processing and coating of optics.

OSCILLATING ROLLER **113**
A precision oscillating roller for improving ink distribution on Multilith Offset Duplicators has been introduced by the Lith-O-Roll Co. Made of brass, it rides on the upper ink form roller, replacing the small rubber idler roller. It is claimed that printing of large halftones or solids, in either black or color, will be simplified with this roller. Price: $35.95.

SETHCO SKIMMER **122**
Skimming devices for keeping the surface of any solution free from dust, grease and other foreign matter are now available from the Sethco Mfg. Co. Constructed of corrosive-resistant plastic, the Sethco Skimmer will remove floating particles from any solution and will draw liquid simultaneously from any depth in the tank. In combination with any filter system it will remove impurities from plating, electro-forming, photographic solutions and chemical dips. It is available in three sizes for ⅜-in., ¾-in. and 1-in. ID hose.

DEVELOPING SYSTEM 155

Amport International Inc. has introduced the Nitro-Matic Temperature Controlled Developing System for solving problems of development where close tolerances are required. It features nitrogen burst development and temperature control and has four separate developing units allowing for simultaneous use of different developers without dumping chemicals. The tanks, baskets and trays are made of fiberglass. A complete unit for prints up to 16 x 20, complete with seven-compartment nitrogen burst equipment, sells for approximately $2995.

"PARA-PAQUE" 154

Para-Paque, an adhesive-backed, transparent film for masking, blocking and opaquing, has been developed by Para-Tone, Inc. According to the manufacturer, it is a light-safe, deep red film that completely blocks the passage of light up to 15 times normal exposure. It is said to have been field-tested on 150-watt blueprint and white print machines down to ½ ft. per minute. Price: 10 x 14 in., 80¢ per sheet; 18 x 24 in., $1.25 per sheet.

REDEE-BOX 121

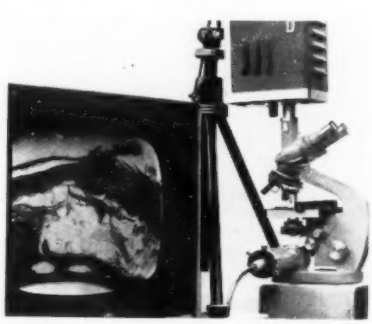
The light-tight Redee-Box, which is said to protect film and paper from moisture and chemical fumes, is now available from the Ester Mfg. Co. Made of 26-gauge steel, each box holds 200 sheets of single-weight paper or 100 sheets of film. Prices: 4 x 5, $2.95; 5 x 7, $3.85; 8 x 10, $5.70; 11 x 14, $9.30.

THERMAL CUT-OUT SWITCH 114

Spindler & Sauppe, Inc., have added a thermal cut-out switch as standard equipment to their Selectroslide to automatically shut off current if undue heat builds up. Coupled with the Venturi blower, which has continuous stall protection, this new feature makes the Selectroslide virtually "burn-out" proof, it is claimed by the manufacturer.

TV MICROSCOPE 123

The introduction of what is claimed to be the world's first closed circuit TV microscope system, uniting a high-resolution TV system with high magnification research microscopes has been announced by the Elgeet Optical Co. With this new system, and an arrangement of objective lenses, the magnification potential of the microscope is enlarged by the size of the TV monitor screen, which is a coordinate function of the magnification. Cost: under $2200.



16MM CINE ZOOM LENS 115

A 20-60mm f/1.8 Vari-Focus Zoom lens for 16mm motion picture cameras has been marketed by Wollensak Optical Co. According to the announcement, it delivers images anywhere in the focal range from wide field (covering 1⅛ times the area of a normal lens) to telephoto of 2½ times magnification. Resolution is said to be better than 50 lines/mm on Plus-X film and 600 lines on TV.

35MM FILM READER

A 35mm film reader for measuring the position of points on exposed 35mm film used in connection with bubble chambers, cloud chambers, meteorology, and target or missile tracking, has been announced by Hydel, Inc., 223 Crescent St., Waltham 54, Mass. Resolution and repeatability is 1 micron and full-scale accuracy is said to be better than ±5 microns through a 50 x 50mm range. Address inquiries to above address.

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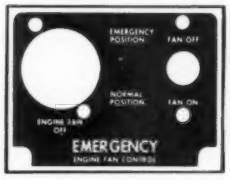

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NATIONWIDE INSURANCE

(*continued from page 46*)

the assignments Lindquist left as he took heavier movie loads. Because most of the photography is for publication, Wells relies most heavily on his photojournalist's kit: a Leica with seven lenses from 25 to 300mm, up to three Stroboflash units (they see frequent service in bounce-light color pictures) and a Mohawk tape recorder for taking notes and captions on the fly. The other end of publications work is copying and resizing artwork. For this, an 11 x 14 Robertson process camera left over from the previous owner of the building comes in most handy. Wells uses litho type emulsions for line copies and Kodak Gravure copy film for continuous tone originals. He likes the Linhof, Deardorff or Graphic View for commercial shots or formal portraits. DK-50 or D-76 are the standard film developers, and Cubitainers with A and B solutions will soon be employed for line work.

Marie Neal contact-proofs all negatives except 35s for the file. She cuts 35s into strips of six, then places one half of two strips in a 4 x 5 glass carrier for proofing at double size on 8 x 10 paper. This gives her six prints per sheet each about 2¼ x 3¼ in picture area.

Six 8 x 10's handle a roll of 36 exposures at a size convenient for judging and filing purposes. Proofs get the same tender loving care as prints for reproduction, including a soak in Kodak Hypo Clearing Agent—for shorter wash time and more assured performance.

The lab inherited a motorized contact printer and a Densichron Analyzer, which Marie and Wells use when a large quantity of prints are required. Omegas and a Leitz Focomat are the most-used enlargers. Besides being an excellent printer, Marie is a skilled retoucher. This part of her craft she picked up in a course at P.P. of A.'s Winona School.

Nationwide generally encourages study in advance courses, membership in professional organizations and attendance at conventions and professional conferences.

The photo unit is not on a profit-and-loss competitive bidding basis. Instead, Cotner considers it an integral part of the graphic arts services to Nationwide. His department exists not only to provide less expensive communication for the company but to provide better visual communication as well. Nevertheless, costs are a factor and he and Lindquist keep close tabs on them. Analysis of three months' work pegged materials and labor costs as follows: taking one average picture and making one print $2.75; road trip, one photographer $28 per day, plus expenses; motion picture work per hour, plus expenses $5; copies for art department, per copy $1.54, Lindquist expects these costs to decrease somewhat as volume increases.

He and Cotner are enthusiastic about their roles. They feel that photography in business is just beginning to make its impact felt. The future, they feel, will see wider applications of effective visual communication.—THE END

MANAGEMENT MEMO

(*continued from page 58*)

sories such as filters, lens hoods and lens caps, etc. Lighting equipment is also left out of the discussion but this is not a cheap item either. A minimum of $2000 was listed by the panel as the cost of setting up an in-plant movie section used by one man.

The next step on the ladder is the substitution of professional studio cameras like the Mitchell for the cameras listed above. This would raise the ante by at least $1000.

The investment of some of the larger sections runs into the hundreds of thousands, although the business handled by these sections is correspondingly large. Douglas has a budget of $750,000 per year for the company Film Service.

In many cases, the still photographers can operate movie equipment with a minimum of trouble. This system is used where the requirements are for technical or straight record photography. However, the movie cameramen in the larger sections often come into industrial work with previous film experience in newsreel, theatrical motion pictures, television or the service. This is doubly true of the essentially non-photographic movie jobs: sound, editing, etc.

One indication of the comparative skill required is that the top civil service rating for a still photographer is a GS 9 paying about $6500 a year. This is the rating given to a second cameraman: the

(*continued on page 95*)

LETTERS

(*continued from page* 29)

that it is, subject to changes due to environmental conditions experienced between the time it leaves the manufacturer and ends up in the camera. Similar variations in processing may occur.

Any number of other variables may also effect the final photographic result. The photographer's own experience with various photographic emulsions—together with the manufacturer's recommendations—are the surest guarantees for optimum results. Departures from eye-true color reproduction vary in degree with the processes and product used. That is, a particular color product might be eminently suitable for a certain subject. Change the subject, even slightly, and another film might be better suited for the job.

On the matter of subject rendition, one of the more famous examples of a "color anomaly" can be found in the blue morning glory. Existing color films tend to reproduce this blue-to-the-eye flower as magenta or pink—much to the chagrin of some avid flower photographers. A color emulsion could be produced that would represent the blue morning glory in a color at least close to the blue the eye sees. Of course, such an emulsion would afford somewhat of a "Pyrrhic Victory," so far as the majority of photographers would be concerned. Faithfully reproduced blue morning glories just aren't as important to most photographers as green grass, blue sky and flesh tones.

On the subject of resolution, again, we have made considerable progress, as the quite noticeable difference between the current Kodak Ektachrome Film, Process E-3 and the former E-1 Film Process illustrates.

Making a top-notch color reproduction is a three-way enterprise involving the manufacturer of the material, the photographer who exposes the material, and the processor. Most important is mutual understanding of the problems and limitations each participant is likely to encounter. The nature of photographic materials precludes the possibility of manufacturing emulsions as identical, for instance, as the steel balls in a roller bearing assembly at least at the present state of the art/science of manufacturing color materials. Strict adherence to control procedures by each participant is, therefore, a must—to keep the effects of such variations at an absolute minimum.

This points up a problem that researchers face in pioneering new emulsions or improving existing color films. Photographic "breakthroughs" of a truly revolutionary nature are unfortunately few and years between. Because of the very nature of the photographic process and the almost infinite number of variables involved, progress is generally gradual rather than abrupt. Similarly, a price must often be paid for noteworthy photographic progress. The price may be paid in one relatively minor aspect of a film's performance, while significant advances are made in several major areas of key interest to a majority of photographers. Any new color film is, then, a compromise among the many requirements such as speed, granularity, resolution, reciprocity, image resolution, optimum reproduction of all possible subject colors, the chemicals used and the simplicity of processing. So it may be true with a new color product that improvement in one limited area may not be readily apparent, although significant improvements are made in most other areas of interest.

Not to be overlooked, of course, is the practice that most successful professional photographers follow—making color tests on each new batch of film purchases. . . .

At the recent PPofA Convention, a significant milestone in color photography was achieved in a display of transparencies by some of the nation's top professional photographers. Visitors to the Kodak exhibit were all but unanimous in their opinions that the transparencies represented the furthest advance to date in the art of color reproduction through the medium of photography. The emulsion—Kodak Ektachrome Film, Process E-3—is comparatively new and does involve certain technological innovations in color film manufacture. But the quality of the transparencies displayed was equally a reflection of the complete professional approach—on the part of both the photographer and the processor. Again—perfection, or near perfection in photography, is a mutual enterprise involving manufacturer, processor, and photographer. Without this co-operation—and strict attention to quality control by all concerned the photographer's finest efforts are often wasted.

F. F. Oberkoetter, Manager
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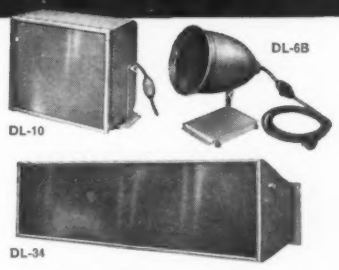

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PHOTO BOOKS IN REVIEW

PROGRESS IN PHOTOGRAPHY 1955-1958 *D. A. Spencer, Editor-in-Chief, The Macmillan Co., New York. 162 pages, plus periodical reference listing and index. $10.*

Reference works on the photographic process seldom can be classed as unique. But the *Progress In Photography* series, of which the present volume is the third and the last can be so described.

Following the pattern adopted for the previous volumes, Volume Three has progress reports on related subjects grouped under several main section headings. Section One, *Practice and New Techniques,* has separate chapters on xerography, image transfer processes, Thermo-Fax and amateur color print processes; Section Two, *Photographic Theory and Materials,* has chapters on photographic sensitivity and latent image formation, mechanism of development, Russian work on the theory of photographic emulsions and new film supports—and so on. The various chapters were prepared by authorities scattered throughout the world. Further evidence of the international scope of the book is the fact that the Editor-in-Chief and the members of his editorial board hail from eight different countries.

It cannot be said that the contents of the book consist of photographic progress that occurred only during the period 1955 to 1958. The bulk of what the authors present dates back some years before 1955. But by discussing most recent achievements within a framework of previous developments a better perspective of true progress is accomplished. Of course real progress in some areas of photography is slow in coming and in others so rapid that the relatively short time required for getting a book published makes the material out of date. For example, the statement in this volume that ordinary writing inks based solely on dyes cannot be copied by the Thermo-Fax process was true at the time of writing, but not true by the time the book appeared on the market.

Section Five, *Applications,* probably will appeal most to industrial photographers, with Section One, already mentioned, running a close second. But it is regretful that the coverage of new applications of photography is so skimpy. This section contains chapters on but three subjects, entitled "New Methods of Motion Picture Presentation," "Photographic Photometry" and "Photomechanical Resists," whereas a host of new photoinstrumentation equipments and techniques were brought into practice from 1955 to 1958.

Sections Three, Four and Six concern photographic business in various countries, the literature of photography and its sources, and a listing of cited periodicals, plus index, respectively. The chapter in Section Four entitled "Russian Literature on the Photographic Process" is particularly valuable and indeed comprehensive: with 200 references.

A special feature of this final volume of *Progress In Photography* is a group of actual color prints tipped-in on four pages between pages 44 and 45, as part of the chapter on amateur color print processes. The following color print processes are represented: Ilford Color, Gevacolor, Kodak Type C (called Ektacolor print process in the U.S.), Afgacolor, Kodak Type R (called Ektachrome print process in the U.S.), Ansco Printon and Ferraniacolor. The Ansco Printon print is an exceptionally poor example and not at all typical of results obtainable with the process.

Few misspellings or errors will be found in this volume. The publishers proofreaders have even learned that there is no "p" in Binghamton, N. Y. But apparently the influence of our cowboy movies caused them to change Edward Western on page 120. And the use of "Cy" as an abbreviation for the word "Company" on pages 88 and 89 is a new one on this reviewer. These minor slip-ups certainly do not detract from the book as a reliable and worthwhile reference.

(It should be mentioned that all three volumes of Progress in Photography *were produced by Focal*

(continued on page 94)

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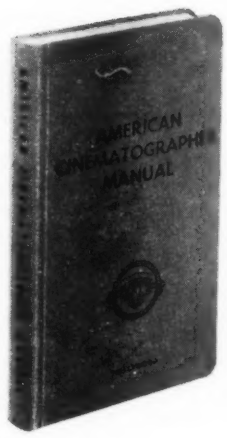

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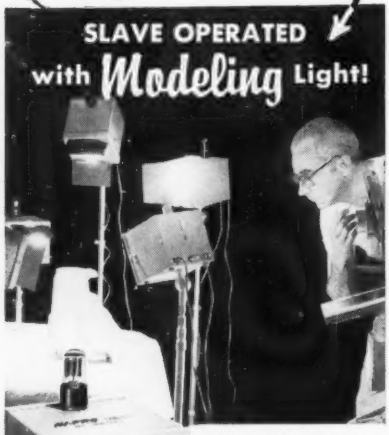

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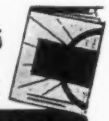

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BOOK REVIEWS

(*continued from page 92*)

Press, Ltd., London. However, the Macmillan Company published a separate edition of Volume Three for U. S. distribution.)

LLOYD E. VARDEN

35MM NEGS & PRINTS *Y. Ernest Satow. Amphoto, New York, 1960. 128 pages. $1.95.*

Y. Ernest Satow is a gifted young photographer and writer who specializes in 35mm. He has provided one of the best introductions to come our way in a long time to the semi-mysterious processes by which a 1 x 1½-in. negative becomes a fairly attractive 10 x 20 print.

Taking each phase of the operation step-by-step, he shows such minor, but important things as how to load a Nikor reel. Best of all, he does express opinions and preferences: too many books on technique become a mere catalog when it comes to discussing materials. While this book will be of most value to the fledgling photographer, it does provide the advanced 35mm man with a basic body of technique in one place.

TAKING PICTURES AFTER DARK *Y. Ernest Satow. Amphoto, New York, 1960. 120 pages. $2.50.*

With this second book, Satow adds his name to the small list of photographic writers who really have something to say. Discussing the techniques of taking pictures without light, Satow covers the field briefly but thoroughly, substituting facts for rhetoric. Most useful for the working photographer are his comments on suitable films and developers for 'available light" work. With the increasing use of photojournalistic techniques in the industrial field, a mastery of these materials is basic. Boiled down, his advice is to choose the materials best suited for your subject, then devote care and thought to all stages, from exposing to printing. Although not as comprehensive as his first book on 35mm technique, this volume is highly recommended.

PHOTO-OFFSET FUNDAMENTALS *John E. Cogoli. McKnight & McKnight, Bloomington. 209 pages, 7½ x 10¼. $4.80.*

Plant personnel, particularly photographers, blueprint operators and the like, are logical candidates for staffing an in-plant duplicating department. In the absence of prior experience, at such time they are in need of a lot of fundamental information about offset-lithography.

A good basic manual for the beginner in the field of photo-offset lithography is John Cogoli's *Photo-Offset Fundamentals.* This new book contains a step by step outline of how an offset job progresses from the original to the printed sheet. Starting with job planning and copy preparation, the reader is carried through line and halftone photography, stripping, platemaking and presswork. Over 300 photographs and line drawings illustrate equipment and procedures. The author, a graphic arts instructor at the high school level, presents the subject in a self-teaching manner—a decided advantage to the novice in getting acquainted with it.

PHOTOGRAPHIC PRODUCTION OF SLIDES AND FILMSTRIPS *Eastman Kodak Co., Rochester, Second Edition, 1960. 50¢*

Anyone who has used the first edition of the publication will find the 1960 model a changed and improved version. New sections include examples of easy-to-use art techniques, making and using a short-run filmstrip printing device, preflashing technique for copying with Ektachrome Type F, a simplified copy stand.

Assuming that he is limited to the use of Kodak equipment, materials and services—it tells the reader everything he needs to know about how to make slide and filmstrip programs for visual education or communication, from the story board to carpentering the copy stand. Of course, every step along the way is lucidly explained.

PRACTICAL PHOTO OFFSET STRIPPING *Lith-Offset Publishing Co., New York.*

The title of this paperback is as well-chosen as the book is well-executed. It promises to come to terms with the day-to-day problems of preparing negatives for the platemaker, and it does just that, nothing more nothing less. The author's scholarship may leave something to be desired, "Ben Day" is written "benday" and "vinyl" is defined as a "stable clear plastic," but his feeling for his trade and the business of presenting the facts in a clear and straightforward manner is unerring.

A foreword states that Deckter is a practicing foreman with 20 years' experience. He obviously knows what he's about. What's more he has a knack for depositing the knowledge in the lap of the reader. Liberal use of diagrams and a few photographs are clarifying.

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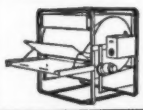

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MANAGEMENT MEMO

(*continued from page 90*)

first camerman is rated at GS 11, about $7500 a year. This is about $1000 a year less than some union scales for comparable work. However, the scale varies with location and job so that there is no exact comparison possible.

The standard in industry today is 16mm both for taking and showing. It is quite possible that in the near future, 8mm will be used widely for small groups or in cases where economy and portability are more important than size. However, most people in the film industry agree that 16mm will be used for taking since it offers the best quality. The 16mm will later be reduced to 8mm, if desired, for projection. This prediction is based on the fact that most people in the business are already set up for 16mm or 35mm shooting, and little would be gained by converting.

The final point in every article such as this is the worth of an in-plant unit. There is no answer except what management thinks it is worth. The in-plant unit offers advantages of internal security, a known level of competence and a familiarity with the product, the firm and its problems. On the other hand, there will be times when highly-paid people and expensive equipment will be sitting around just doing nothing.

However, the fact that in-plant photography has grown tremendously in the past few years, leads to the conclusion that as industry finds more uses for movies, the willingness to part with the necessary capital increases.

Required reports

Not the least of these uses is the periodic film report required in many military procurement contracts. These film reports are essentially documentary, need to be up to the minute and keep a few people, at least, busy throughout the term of the contract. As a result a good many of them are made by in-company men. The various programs supported by the Army, Navy, Air Force and National Aeronautics and Space Administration (*see The Film Report*, PMI, *October 1960, pp. 42-45*) have boosted in-company photography to no inconsiderable degree.

The very fact of a capable motion picture crew on the premises has accelerated the demand for industrial communication through motion picture film.—THE END

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NEW ILFORD RATINGS

Printed below are the new film speeds for Ilford black-and-white camera films sold in the United States, as released by Ilford, Inc. This brings to three the number of manufacturers who have furnished film speeds in compliance with a new American Standard (PH2.5—1960) adopted in April of last year. The Ansco and Kodak film speeds were printed in an article announcing the adoption of the new system (*see "Higher and Higher and Higher,"* PMI, *June 1960*).

The Log_2 film speeds shown here are part of a new system outlined in the new American Standard for simplifying exposure calculation. In general, they have no direct application currently. But they will have importance when and if camera and meter manufacturers calibrate equipment for the use of this system, called APEX.

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HP3	400	37°	27°	7°
FP3	125	32°	22°	5.5°
Hyperchromatic	400	37°	27°	7°
G8.30 Comm. Ortho	80	30°	20°	4.5°
ROLL FILMS				
HPS	800	40°	30°	8°
HP3	400	37°	27°	7°
FP3	125	32°	22°	5.5°
35mm MINIATURE FILMS				
HPS	800	40°	30°	8°
HP3	400	37°	27°	7°
FP3 Series 2	125	32°	22°	5.5°
Pan F	50	28°	18°	4°
16mm and 35mm NEGATIVE CINE FILMS				
HPS	800	40°	30°	
HP3	400	37°	27°	
FP3 Series 2	160	33°	23°	
Pan F	50	28°	18°	
AERIAL FILMS				
Aerial N	800	40°	30°	
HP3 Aerial	400	37°	27°	
Hyperpan	250	35°	25°	
HR Aerial	64	29°	19°	
PLATES				
HPS	800	40°	30°	8°
HP3	400	37°	27°	7°
R.10 S.G. Pan	100	31°	21°	5°
R.20 S.R. Pan	50	28°	18°	4°
Selochrome	250	35°	25°	6.5°
Q.30 Chromatic	10	21°	11°	1.5°

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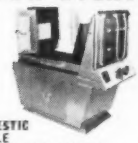

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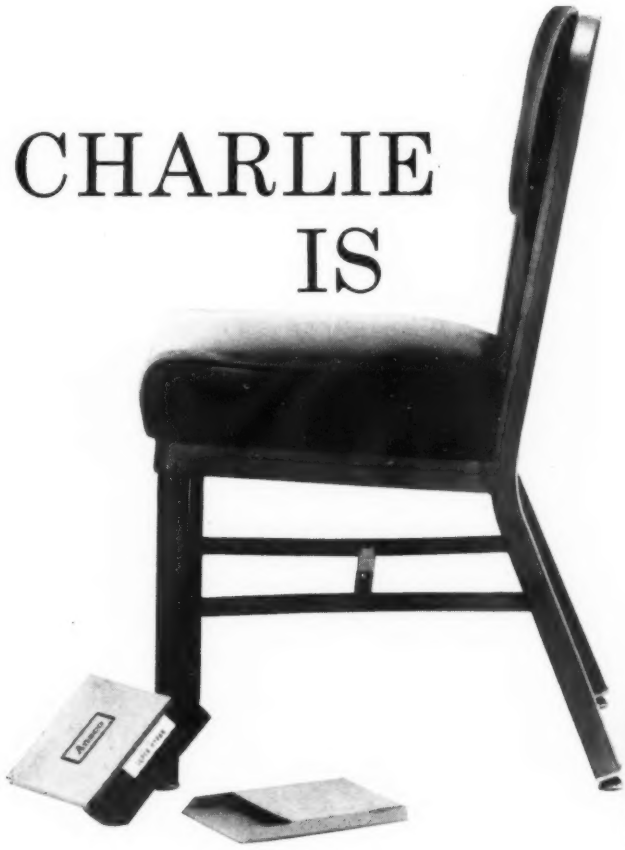

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